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UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

B. T. GALLOWAY, Chief of Bureau

119
R E F E R E N C E B O O K

C f t h e W o r k o f t h e

BUREAU OF PLANT INDUSTRY

For the Fiscal Year

1 9 0 9

P r e p a r e d

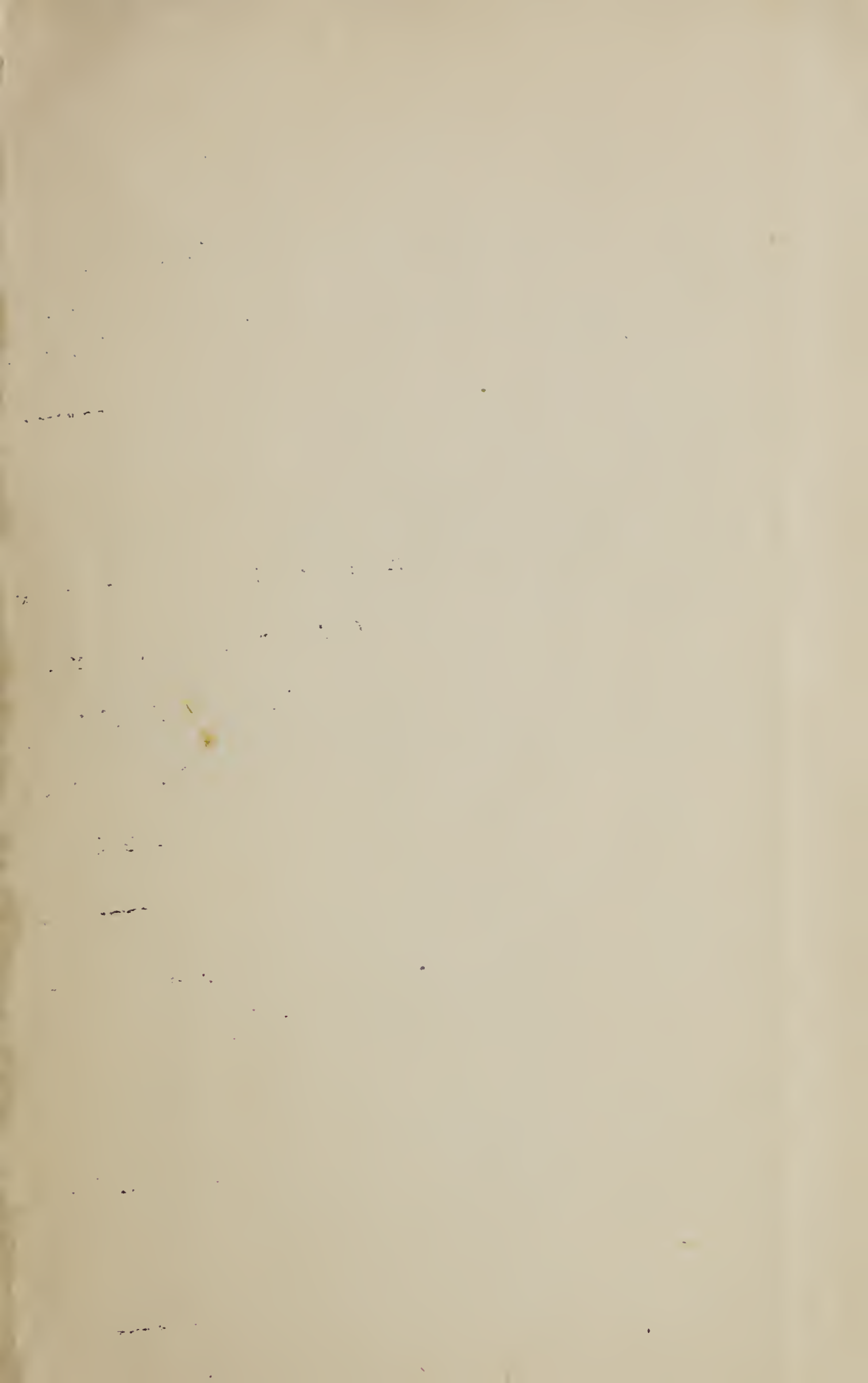
Under the Direction of the
Chief of Bureau

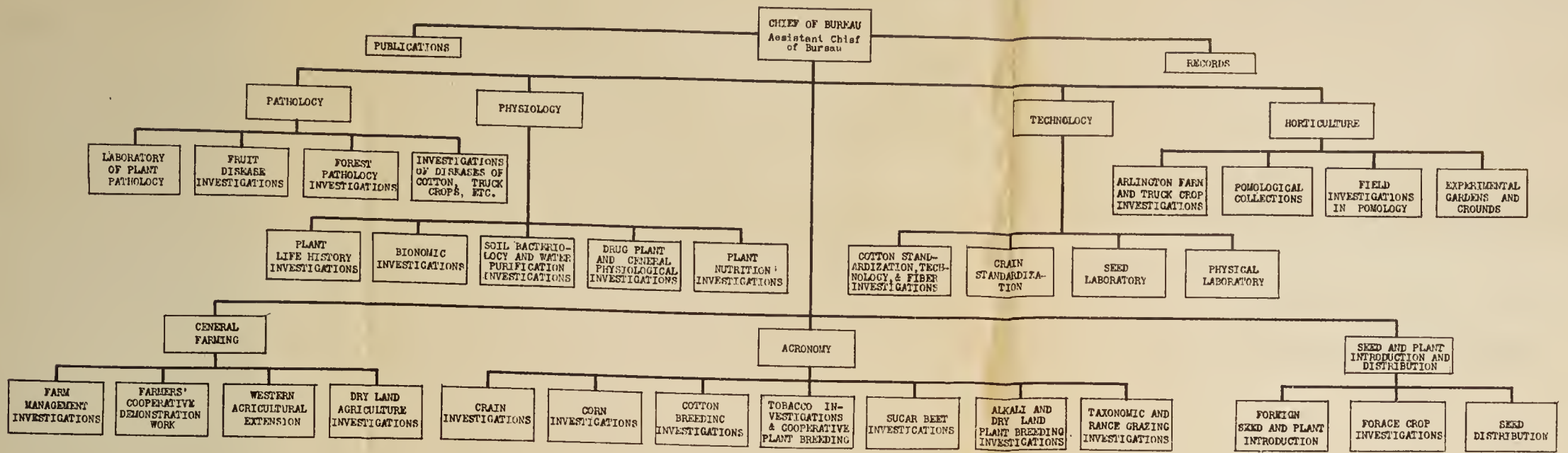
By

WILLIAM L. MARCY

WASHINGTON

1909





OFFICERS AND SCIENTIFIC STAFF

CHIEF OF BUREAU
BEVERLY T. GALLOWAY, Physiologist and Pathologist

ASSISTANT CHIEF OF BUREAU
ALBERT P. WOODS, Physiologist and Pathologist

PATHOLOGY	LABORATORY OF PLANT PATHOLOGY ERWIN F. SMITH Pathologist in Charge	Identification of diseased specimens; study of bacterial diseases of plants, methods of prevention, etc. Pathological collections; inspection of greenhouses, plants imported, etc.	Dr. Smith, assisted by John R. Johnston, Florence Hedges, James F. Brewer, and Lucia McCulloch Flora W. Patterson, Mycologist, assisted by Vera K. Charles	FARM MANAGEMENT INVESTIGATIONS W. J. SPILLMAN Agriculturist in Charge	General supervision of all investigations Farm management investigations and demonstrations in sectional districts, viz: (1) N.C., S.C., Ga., and Fla.; (2) Ala., Miss., and Tenn.; (3) La. and Ark.; (4) Tex. and Okla.; (5) New York and New England; (6) Oreg., Wash., Idaho, and N. Cal.; (7) Iowa, Mo., Kans., Nebr., and S. Dak.; (8) Va., Md., and Del.; (9) Ill., Ind., Ohio, Ky., and W. Va.; (10) N.J. and Pa.; (11) Wis., Mich., Minn., N. Dak., and S. Dak. Farm practice investigations and demonstrations in special phases of farming, viz: (1) forage production on beef, hog, and sheep farms; (2) tillage and weed eradication; (3) hay and haying; (4) use of manure and fertilizers Range management and cattle investigations Study of farm economics—accounts, records, organization, equipment, buildings, machinery, etc. Preparation of working plans for farms	Prof. Spillman D.A. Brodie, Assistant agriculturist, in general charge, and (1) C.L. Goodrich and A. C. Smith; (2) M. A. Crosby; (3) A. D. McNair; (4) B. Youngblood; (5) L. G. Dodge, M. C. Burritt, and C. E. Monroe; (6) Byron Hunter; (7) J. A. Warren; (8) H. A. Miller; (9) J. A. Drake; (10) G. A. Billings; (11) J. C. McDowell
	INVESTIGATIONS OF DISEASES OF FRUITS MERTON B. WAITE Pathologist in Charge	Investigations of orchard diseases; eradication of pear blight, peach diseases, etc. Investigations of diseases of the grapes, cranberry, and other small fruits Spraying experiments and demonstrations in the control of orchard diseases	Mr. Waite, assisted by P. J. O'Gara, W. S. Ballard, F. V. Rand, and Clara H. Hesse C. L. Shear, Pathologist, assisted by G. F. Miles, L. A. Hawkins, and Anna K. Wood W. M. Scott, Pathologist, assisted by J. B. Rorer and T. W. Ayres		C. B. Smith, Assistant agriculturist, in general charge, and (1) J. S. Cotton and D. H. Doane; (2) J. S. Cates and H. R. Cox; (3) H. B. McClure; (4) J. C. Beavers	David Griffiths, Assistant agriculturist, and L. W. Ellis J. W. Freely, Assistant
	INVESTIGATIONS IN FOREST PATHOLOGY HAYDEN METCALF Pathologist in Charge	Investigations of diseases of forest trees and woods, ornamental and shade trees, and shrubs; diseases caused by mistletoe, etc. Investigations of white pine blight, damping-off disease of tree seedlings, etc.	Dr. Metcalf and George G. Hadcock, Pathologist, assisted by Carl P. Hartley Perley Spaulding, Pathologist		Dr. Knapp, assisted by S. Arthur Knapp, J. P. Campbell, and H. E. Savely Dr. Knapp, assisted by (1) W. F. Proctor, (2) J. L. Quicksall; (3) W. D. Bentley; (4) J. A. Evans; and (5) R. S. Wilson, all of whom direct a corps of agents	Dr. Knapp, assisted by (1) A. S. Meharg, (2) Albert Gentry, (3) I. W. Williams, (4) C. R. Hudson, and (5) T. O. Sandy
	INVESTIGATIONS OF DISEASES OF COTTON, TRUCK CROPS, ETC. W. A. ORTON Pathologist in Charge	Investigations of diseases of cotton, cowpeas, truck crops, etc.; breeding of diseases resistant varieties; spraying demonstrations, etc. Plant disease survey—collection of data regarding occurrence and spread of plant diseases	Mr. Orton, assisted by W. W. Gilbert and L. L. Hartner Mr. Orton, assisted by Adeline Ames		General direction of the work Demonstrations of improved cultural methods in boll weevil sections, viz: (1) east Texas; (2) west Texas; (3) Oklahoma; (4) Louisiana and Arkansas; (5) Mississippi and Alabama Cooperative extension of demonstration work into (1) Florida, (2) Georgia, (3) South Carolina, (4) North Carolina, and (5) Virginia	
PHYSIOLOGY	PLANT LIFE HISTORY INVESTIGATIONS WALTER T. SWINGLE Physiologist in Charge	Establishment of date culture; life history investigations of fruits and nuts; cooperative demonstrations on Indian reservations, etc. Alfalfa and clover life history investigations Investigations of dry land tree crops—olives, almonds, peaches, etc.	Mr. Swingle, assisted by W. L. Flannery, E. M. Savage, E. W. Hudson, and Bruce Drummond Charles J. Brand, Physiologist Silas C. Mason, Arboriculturist	DRY LAND AGRICULTURE INVESTIGATIONS E. C. CHILCOTT Agriculturist in Charge	Investigations and experiments in the semiarid West or Great Plains Area—Mont., N. Dak., S. Dak., Nebr., Kans., Colo., and Tex.; devising of crop rotations, cultural methods, etc.	Prof. Chilcott, assisted by J. S. Cole, C. A. Jensen, J. M. Stephens, F. L. Kennard, J. E. Payne, W. W. Burr, E. F. Chilcott, and O. J. Grace
	BIONOMICS INVESTIGATIONS O. F. COOK Bionomist in Charge	Acclimatization and adaptation of weevil resistant cottons, corn for special conditions, etc.; study of tropical crops—rubber, cacao, etc.	Mr. Cook, assisted by H. Pittsler, C. W. Collins, F. L. Lewton, Argyle McLaughlin, J. H. Kinsler, and C. B. Doyle		Establishment of profitable agriculture on the U.S. Reclamation Projects; testing of crops suited for growth on reclaimed lands Operation of experiment farm at San Antonio, Tex.	Mr. Scofield, assisted by F. B. Headley, W. A. Peterson, and S. J. Rogers Mr. Scofield, assisted by S. H. Huetting
	SOIL BACTERIOLOGY AND WATER PURIFICATION INVESTIGATIONS KARL F. KELLERMAN Physiologist in Charge	Investigations in soil bacteriology, especially with reference to plant nutrition; investigations and distribution of nodule-forming bacteria for inoculation of legumes; study and demonstration of farm water purification, etc.	Mr. Kellerman, assisted by T. R. Robinson, E. R. Allen, Ira G. McBeth, F. L. Goll, and Edna H. Fawcett		Wheat investigations; cereal breeding and introduction; crop rotation experiments; etc. Experiments with dry land cereals—adaptation, improvement, etc. Grain sorghum investigations and improvement Oat adaptations and breeding Barley introduction and improvement Rice investigations and improvement Investigations of cereal roots, stems, etc. Grain experiments in the Texas Panhandle	Mr. Carleton, assisted by H. F. Blanchard, H. J. Culbarger, and V. L. Cory W. M. Jardine, Agronomist, assisted by F. D. Farrell, C. Salmon, and W. O. Shelley Carlton R. Ball, Agronomist C. W. Warburton, Agronomist, assisted by L. C. Burnett R. B. Dorr, Agronomist Charles E. Chambliss, Expert E. C. Johnson, Pathologist John F. Rose, Superintendent
	DRUG PLANT, POISONOUS PLANT, AND GENERAL PHYSIOLOGICAL INVESTIGATIONS RODNEY H. TRUE Physiologist in Charge	Establishment and study of camphor culture Experiments and demonstrations in drug plant cultivation Investigations of hops, tanning and dye plants Preparation of literature on native drug plants Investigations of industrial alcohol manufacture from the waste products of the farm Investigations of American lemon production Field work on poisonous plants—locowoods, etc. Laboratory work on drug and poisonous plants	Dr. True, assisted by S. C. Hood and Frank Rabak Dr. True, assisted by G. F. Klugh and T. B. Young W. W. Stockberger, Pharmacognosist Alice Heakel, Assistant Dr. True Dr. True, assisted by A. F. Sievers Dr. True, assisted by C. F. Mitchell C. D. Bright Marsh, Expert Carl L. Alsberg, Expert		Notes.—The projects forming this branch of the Bureau, which is now being organized, are distributed among the various other lines of investigation of the Bureau, herein described.	
TECHNOLOGY	COTTON STANDARDIZATION, CROP TECHNOLOGY, AND FIBER PLANT INVESTIGATIONS N. A. COBB Technologist in Charge	Laboratory studies in crop technology; development of improved apparatus and methods Experiments and demonstrations in fiber plant production, use of improved machinery, etc. Investigations in cotton standardization; study and improvement of methods of baling, etc.	Dr. Cobb, assisted by W. E. Chambers Lyster H. Dewey, Botanist R. L. Bennett, Special agent	GRAIN INVESTIGATIONS M. A. CARLETON Cerealist in Charge	Wheat investigations; cereal breeding and introduction; crop rotation experiments; etc. Experiments with dry land cereals—adaptation, improvement, etc. Grain sorghum investigations and improvement Oat adaptations and breeding Barley introduction and improvement Rice investigations and improvement Investigations of cereal roots, stems, etc. Grain experiments in the Texas Panhandle	Mr. Carleton, assisted by H. F. Blanchard, H. J. Culbarger, and V. L. Cory W. M. Jardine, Agronomist, assisted by F. D. Farrell, C. Salmon, and W. O. Shelley Carlton R. Ball, Agronomist C. W. Warburton, Agronomist, assisted by L. C. Burnett R. B. Dorr, Agronomist Charles E. Chambliss, Expert E. C. Johnson, Pathologist John F. Rose, Superintendent
	GRAIN STANDARDIZATION JOHN D. SHANAHAN Technologist in Charge	General supervision of all investigations Laboratory investigations in grain standardization; development of improved methods; etc. Operation of grain standardization laboratories at (1) New York, N.Y.; (2) Chicago, Ill.; (3) Baltimore, Md.; (4) New Orleans, La.; (5) St. Louis, Mo.; (6) Minneapolis, Minn.; and (7) Duluth, Minn. Interstate grain transportation investigations Trans-Atlantic grain transportation investigations Wheat milling and baking tests, Fargo, N. Dak.	Mr. Shanahan and J. W. T. Duvel, Assistant J. W. T. Duvel, assisted by A. B. Cron and J. H. Cox Mr. Shanahan and Dr. Duvel, assisted by (1) Clyde E. Leighty, (2) W. P. Carroll, (3) Laurel Duval, (4) E. C. Richey, (5) E. L. Morris, (6) A. M. Sattre, (7) J. Ryder, L. M. Joffe, Assistant, and P. Rothrock E. G. Roemer, Assistant L. A. Fitz, Assistant, and Clyde H. Bailey		Extension of sugar beet culture; development of single-germ seed; improvement of beets; control of diseases of sugar beets; etc. Investigations of beet sugar production Development of home production of beet seed	Dr. Townsend, assisted by E. C. Rittus, H. R. Shaw, Nellie A. Brown, and Clara O. Jamieson C. F. Seyler, Special agent J. E. W. Tracy, Assistant, and J. F. Reed
	SEED LABORATORY EDGAR BROWN Botanist in Charge	General seed testing, detection of adulteration; investigations of seed vitality; improved methods of handling seeds; etc. Operation of cooperative seed-testing laboratories at (1) Lincoln, Nebr., and (2) Columbia, Mo.	Mr. Brown, assisted by F. H. Hillman and W. L. Goss Mr. Brown, assisted by (1) Nellie Stevenson and (2) Lovina S. Morick		Alkali and drought resistance of crops to alkali and drought; development of Egyptian cotton culture in the Southwest; study of the physiology of alkali and drought resistance	Mr. Kearney, assisted by H. L. Shantz and A. C. Dillman
	PHYSICAL LABORATORY LYMAN J. BRIGGS Physicist in Charge	Physical and physiological determinations of the various factors governing plant growth; development of improved apparatus and methods of handling and producing crops	Dr. Briggs, assisted by J. O. Bals, J. W. McLane, and Julia R. Pearce		General supervision of investigations; improvement of existing areas on the National Forests Preparation of a manual of the American grasses Compilation of information on economic plants Economic collections of cultivated plants; identification of new and introduced plants; etc.	Mr. Coville A. S. Hitchcock, Systematic agronomologist, assisted by Agnes Chase W. E. Fafford, Assistant curator W. F. Wright, Botanist, assisted by P. L. Ricker, C. F. Wheeler, and H. C. Skeels
HORTICULTURE	ARLINGTON EXPERIMENTAL FARM AND TRUCK CROP INVESTIGATIONS L. C. CORBETT Horticulturist in Charge	General supervision and improvement of the Arlington, Va., Farm; tests of vegetables, flowers, fruits, etc.; greenhouse experiments Standardization and testing of vegetables Investigations and experiments with truck crops, peanuts, etc.; demonstrations in horticulture	Prof. Corbett, assisted by E. C. Butterfield, W. V. Shear, and J. H. Tull W. W. Tracy, Sr., Superintendent Prof. Corbett, assisted by W. R. Beattie	FOREIGN SEED AND PLANT INTRODUCTION DAVID FAIRCHILD Agricultural Explorer in Charge	Direction of agricultural explorations; propagation and testing of foreign seeds, plants, etc.; miscellaneous plant introductions Agricultural explorations in the Orient, viz: (1) China and eastern Asia; (2) Siberia and central Asia; (3) Japan (bamboo explorations) Malting barley investigations and introduction Matting plant investigations and introduction Operation of special testing gardens at (1) Chicago, Ill.; (2) Brownsville, Tex.; (3) Miami, Fla.	Mr. Fairchild, assisted by Walter Fincher, R. A. Young, and F. F. Chiscoln Agricultural explorers: (1) Frank N. Meyer; (2) N. E. Hansen; (3) Wm. D. Hills Albert Mann, Expert, assisted by Dana W. Fraser Mr. Fairchild, assisted by F. W. Clarke in charge of (1) W. W. Tracy, Jr.; (2) E. C. Olson; (3) J. J. Venter
	POMOLOGICAL COLLECTIONS G. B. BRACKETT Pomologist in Charge	Dissemination of information regarding the culture and uses of fruits; collection, identification, modeling, and painting of fruit varieties; simplification of nomenclature, etc.	Mr. Brackett, assisted by W. H. Ragan and W. W. Irwin		General testing of forage crops; propagation and distribution of seed of valuable varieties Alfalfa and clover introduction and extension Testing, extension, and improvement of new and standard grasses Cowpea and soy bean investigations Sorghum investigations and extension Testing of forage and cover crops for the Gulf coast region	Prof. Piper, assisted by Roland McKee, M. W. Evans, and W. J. Morse J. M. Westgate, Assistant agronomologist, and Nicholas Schmitt R. A. Oakley, Assistant agronomologist, and H. N. Vinnall Prof. Piper, assisted by H. T. Nielsen Prof. Piper, assisted by A. R. Connor S. M. Tracy, Special agent
	FIELD INVESTIGATIONS IN POMOLOGY W. A. TAYLOR and G. HAROLD POWELL Pomologists in Charge	Fruit marketing—experimental export shipments of fruit; improvement of methods of packing, handling, etc. Fruit transportation and storage—prevention of decay in transit; study of farm fruit storage Viticultural investigations—experiments with resistant grape stocks; development of grape culture, manufacture of grape juice, etc. Fruit district investigations—study of adaptability of varieties, their uses, season, etc. Pecan investigations—culture, adaptability, etc.	Mr. Taylor, associated with Mr. Powell and assisted by L. S. Tanny, G. W. Hosford, H. M. White, and A. W. McKay Mr. Powell, assisted by A. V. Stubbs, Nevers, Tenny, Hosford, White, McKay, S. J. Dennis, and C. S. Pomeroy George C. Hamman, Pomologist, assisted by F. L. Huesmann and Alfred Tournier H. P. Gould, Pomologist, assisted by W. F. Fletcher Mr. Taylor, assisted by C. A. Reed		Regular distribution of varieties of vegetable, flower, grass seeds; bulbs, vines, plants, etc. Distribution of select varieties of cotton, tobacco, and melon seeds; citrus trees, etc.	Mr. Morrison and J. E. W. Tracy Mr. Morrison, in cooperation with various officers of the Bureau
	EXPERIMENTAL GARDENS AND GROUNDS E. M. BYRNES Superintendent	Care and ornamentation of Department grounds; operation of greenhouse, trial grounds, etc.; experiments with crops under glass, etc. Hybridization of plants; propagation of new and rare plants	Mr. Byrnes, assisted by a corps of gardeners George W. Oliver, Expert			

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY
B. T. GALLOWAY, Chief of Bureau

R E F E R E N C E B O O K

O f t h e W o r k o f t h e

BUREAU OF PLANT INDUSTRY

For the Fiscal Year

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P r e p a r e d

Under the Direction of the
Chief of Bureau

By

WILLIAM L. MARCY

WASHINGTON

1909

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R E F E R E N C E B O O K

BUREAU OF PLANT INDUSTRY

SYNOPSIS OF THE WORK OF THE BUREAU

The Bureau of Plant Industry is authorized to expend for the fiscal year 1909 the sum of \$1,348,576.* Of this amount \$187,410 is for statutory salaries, chiefly of the clerical force; \$258,000 for the purchase and Appropriations distribution of seeds; \$6,900 for special tests of paper-manufacturing plants; and the remainder, \$896,266, is apportioned among the various lines of investigation, experiment, and demonstration conducted by the Bureau in all parts of the country. The map at the end of this pamphlet will show in detail the geographical distribution of the Bureau's work. Cooperation with the Agricultural Experiment Stations of every State and Territory, with one exception, is in effect in one or more Organization branches of the work of the Bureau. All of the work of the Bureau is conducted on the project plan, each office or laboratory having in charge a definite group of projects. The organization of the Bureau is such as to place direct responsibility on the officers in charge of the various lines of investigation. All general administrative work is handled by the Chief and

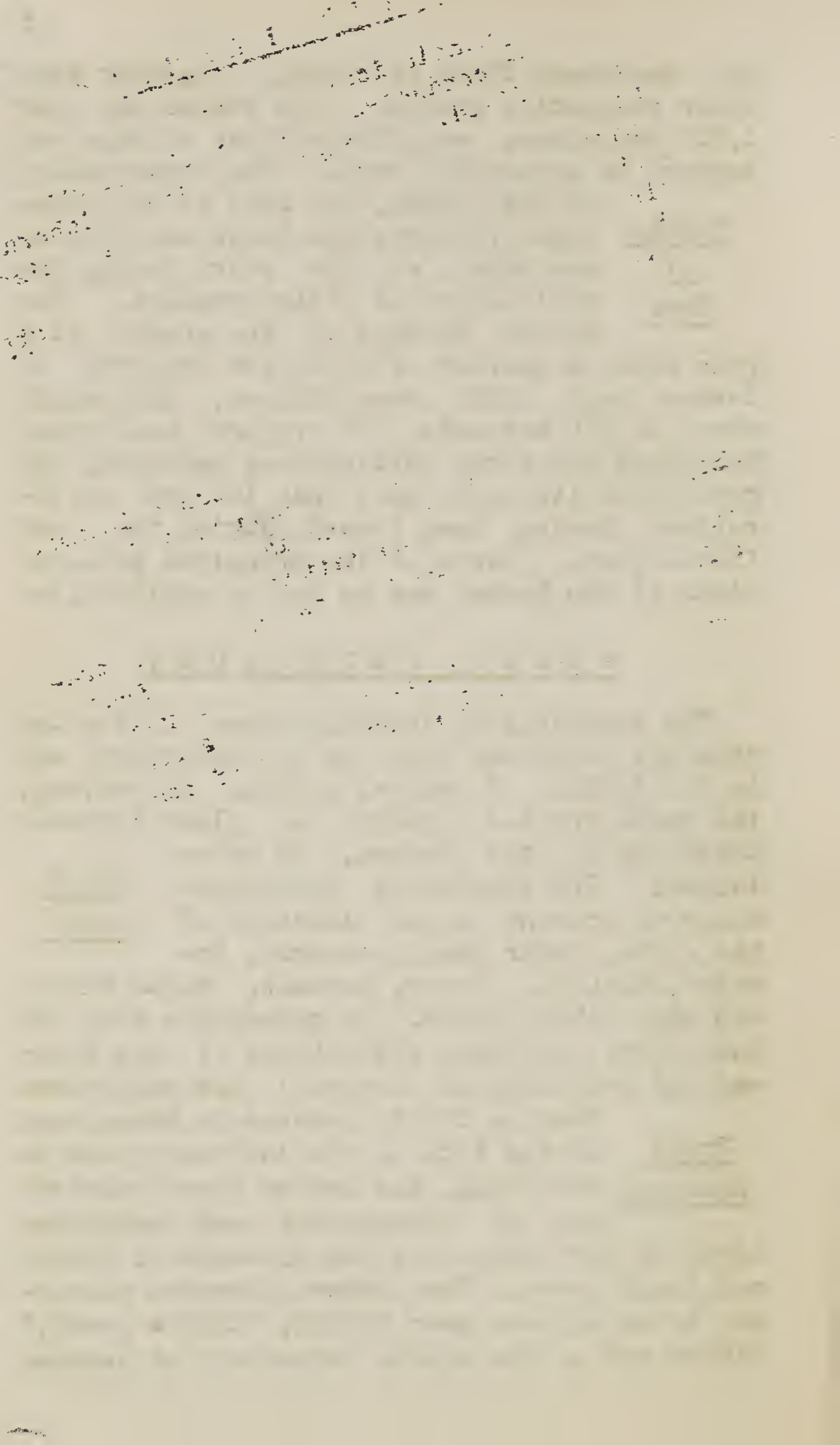
*These figures are exclusive of an immediately available fund of \$50,000 from the appropriations for the fiscal year 1910, which amount in the aggregate to \$1,709,266.

the Assistant Chief of Bureau, together with their respective staffs. The Bureau has over 1,000 employees, about two-thirds of whom are engaged in scientific work. The organization of the Bureau, as well as the principal officers and their assistants, are shown on the chart facing the title-page of this pamphlet. The Volume of Work Bureau handles in the course of a year about a quarter of a million letters; it issues about 6,000 requisitions; and audits about 12,000 accounts. It prepares and issues bulletins and other publications embodying the results of its work, more than 100 new publications having been issued during the last fiscal year. Lists of the principal publications of the Bureau may be had on application.

P L A N T P A T H O L O G Y

The pathological investigations of the Bureau are conducted both in the laboratory and in the field. A central working laboratory, the basis for all studies of plant diseases under way in the Bureau, is maintained. The laboratory investigations at present cover diseases of the olive, sugar cane, coconut, tobacco, alfalfa, clover, cereals, sugar beets, and many other plants. In connection with the laboratory, economic collections of mycological and pathological material are maintained.

Work on fruit diseases is being conducted both in the laboratory and in the field, the latter phase consisting of experiments and demonstrations in the control of the diseases of fruits and fruit trees. The orchard diseases receiving attention are pear blight, "little peach," bitter rot of the apple, brown rot of peaches



and other stone fruits, the crown-gall diseases of various fruits, etc. Spraying and other methods for the control of these diseases are being demonstrated in infected areas in various States, in cooperation with the Agricultural Experiment Stations and with individuals. Diseases of small fruits, such as the grape and cranberry, are also being investigated, as are the diseases affecting citrus and other subtropical trees and fruits.

The Bureau conducts investigations in forest pathology in close cooperation with the Forest Service, as well as with the State experiment stations, nurserymen, lumber companies, and other agencies. Practically all

Forest diseases of forest trees and woods
Pathology are being studied, especially those encountered in the National Forests of the western United States. Dis-

eases of ornamental and shade trees and shrubs are also receiving attention, methods of their prevention or control being worked out. Another group of pathological projects of the Bureau covers the diseases of cotton, truck crops, and related plants.

Cotton
The work on cotton diseases is carried on with special reference to the boll weevil problem, the breeding of varieties resistant to wilt, root-rot, and other diseases encountered in boll weevil sections, as well as the working out of remedies for those diseases, being under way. Similar work is being conducted with cowpeas. The pathological work on truck crops includes the various diseases affecting potatoes, cucumbers, melons, lettuce, spinach, and other vegetables, the breeding of resistant varieties and the discovery of remedies being under way. In connection with this work a comprehensive plant disease survey is made annually and the information thus obtained published.

PLANT PHYSIOLOGY AND ACCLIMATIZATION

Plant adaptation or acclimatization forms a considerable portion of the work of the Bureau. Much of this work involves life history and bionomic studies of the various crop plants under investigation. Leading features are the establishment of date culture and the study of the life history of the date palm; an investigation of the caprification of the fig and of the life history of figs and caprifigs; the breeding of hardy citrus fruits; the establishment of pistache culture; and investigations of wild and desert peaches, almonds, and other fruit and nut crops. This work has special reference to the securing of deep-rooted and drought-resistant tree crops suited for growth under arid conditions. Life history investigations of alfalfa and clover

Fruits and Tree Crops

Alfalfa and Clover

are being conducted, with a view to discovering drought-resistant varieties for the semiarid portions of the West and hardy varieties for the colder sections of the United States.

Trials of new alfalfas and clovers are being made. In connection with all of the life history investigations of the Bureau, demonstration farms have been established in the drier portions of the Southwest, some of which are located on the Indian Reservations and conducted in cooperation with the Of-

fice of Indian Affairs of the Department of the Interior. The objects of the latter phase of this work are to teach improved methods

Indian Coopera- tion

of agriculture among the Indians, with particular reference to the growing of such crops as alfalfa, cotton, dates, figs, and olives; and to educate Indian labor in the handling of these and other crops grown by the white settlers in the vicinity.

The bionomic investigations of the Bureau include in a general way all crops originating in tropical countries, but at present chief attention is being given to the adaptation of tropical varieties of cotton and corn to conditions in the southwestern United States. Weevil-resisting varieties of Central American cotton are being acclimatized in the South, as well as drought-resistant varieties, in order to extend cotton culture into the drier regions where the weevils are less injurious. Experiments are also under way with Central and South American varieties of corn adapted to special conditions of moisture, drought, and irrigation, to acclimatize them in parts of the South and West where our present varieties do not thrive. Other tropical crops receiving attention are rubber, the mango, avocado, cacao, and banana.

GENERAL PLANT PHYSIOLOGY

The Bureau conducts investigations in soil bacteriology and water purification. The former line consists of the isolation of various types of soil bacteria and the correlation of their economic value; an investigation of the bacteria concerned in nitrification and of their rôle in plant nutrition, as well as of the probable correlation of bacteriological activity in the soil with cultural conditions. Experiments with legume bacteria are being conducted in connection with this work, consisting of the distribution of pure liquid cultures of nitrogen-fixing bacteria for inoculating leguminous plants; the study of the conditions under which nodule-forming bacteria

Soil
Bacteri-
cology

are unable to form nodules; the breeding and selection of more virile types of nodule-producing organisms; and the study of the life history of nitrogen-fixing bacteria. Water purification work is conducted as conditions

Water demand in connection with farm water supplies, the object being to study
Purifi- means of controlling algal and bac-
cation terial pollutions, especially in connection with the use of copper as a treatment. Another line of investigation closely associated with the bacteriological work, which has been recently begun, has to do with plant nutrition.

Drug plant investigations are being conducted by the Bureau, including the testing of both wild and cultivated drug-producing plants, of both foreign and domestic origin; a study of campher utilization and Drug production in the United States, with Plants a view to the development of a domestic source of supply for this product; and various other lines of laboratory and field investigation. In close association with this work various other physiological studies are under way, including tests of alcohol production on the farm from potatoes, waste products, etc.; investigations of the growing, curing, and handling of American hops, and also of American lemons; experiments in red pepper growing for spice purposes; and

Alcohol, tests of perfumery and other special
Hops, Tea, plants. Tea culture investigations
Etc. are being carried on to ascertain

the practicability of growing and manufacturing tea on a profitable commercial basis, and to work out the relation between quality and constituents, with a view to the improvement of processes and product. The work consists of both field and factory tests, as well as laboratory investigations.

Poisonous plant investigations are being conducted, including chiefly the study of the so-called loco disease of live stock, with a view to its prevention by the eradication of the weeds causing it and by the development of methods of control. Work on other stock-poisoning plants, such as the mountain laurel, larkspur, death camas, and mistletoe, is also under way, antidotes and preventives for these poisons being sought. Considerable attention is being given to a study of the poisonous plants found on the National Forests and to working out methods for exterminating them. This phase of the work is conducted in close cooperation with the Forest Service.

Poisonous Plants

AGRICULTURAL TECHNOLOGY

The technological work of the Bureau on various crops is conducted both in the laboratory and in the field. The laboratory work includes the development and improvement of apparatus and machinery used in practical agricultural work; technological studies of cereals, including biological analyses of various grains; and other lines of work in cooperation with various offices of the Bureau, having for their object the improvement of methods of handling and growing crops.

Laboratory

In connection with these investigations work is being conducted in the cotton States having for its objects the improvement of methods of preparing, ginning, baling, and marketing cotton, with a view to lessening damage and standardizing the commercial grades of cotton, in accordance with recent legislation. Closely associated with this work is the study of cotton

Cotton Standardization

and other plant fibers such as hemp, flax, ramie, sisal, and henequen. The objects of the experiments with these plants are to improve the methods of handling fiber crops and the encouragement of plant fiber industries. In

Fiber accordance with recent legislative
and Paper authority, tests of various plants
Plants as to their suitability for the
 manufacture of paper are also being
 made in connection with the fiber
plant investigations, with the object of developing new sources of supply for the raw materials used in the manufacture of the commercial grades of paper.

Investigations in grain standardization are being carried on by the Bureau, laboratories being maintained at the chief grain centers for this purpose. The object of this work is to collect information which will make possible the establishment of United States standards for the commercial Grain
grades of grain, which can be mathematically fixed and will be fair to Standard-
all concerned in the production and ization
marketing of grain crops. The ocean and interstate transportation of grain is being studied, with a view to determining the causes of and remedies for deterioration in transit.

Closely related to the standardization work with various crops are the seed testing laboratories maintained by the Bureau for the purpose of examining samples of commercial seeds

Seed as to the presence of adulterants,
Testing and publishing, in accordance with
 law, the results of such examinations; for making tests of seeds for farmers and others as to germination and mechanical purity; and the testing of samples of imported seed to guard against the importation of adulterants. Improved methods of testing and handling seeds are being worked out.

The first part of the document is a letter from the Secretary of the
Board of Directors to the Shareholders. It is dated the 1st day of
January, 1900. The letter is addressed to the Shareholders of the
Company. It contains a report on the business of the Company for the
year 1899. The report is a summary of the business of the Company
for the year 1899. It contains a statement of the assets and liabilities
of the Company, and a statement of the income and expenses of the
Company. It also contains a statement of the dividends paid to the
Shareholders. The letter is signed by the Secretary of the Board of
Directors, and is dated the 1st day of January, 1900.

The Bureau maintains a Physical Laboratory, in connection with its other technological work. This laboratory is charged with the determination of the physical and physiological factors which influence the growth of crops, and the devising of instruments and methods for the quantitative measurement of such factors. Especial attention is being given to a study of the influence of different cultivation methods on the conservation of moisture in the arid and semiarid regions, in close cooperation with the other branches of the Bureau which are working on related problems.

Physical
Labor-
atory

A G R O N O M Y

The grain investigations of the Bureau include adaptation work with rye, barley, wheat, winter oats, etc.; the extension of the area of winter wheat and other winter grains; experiments with durum wheat, a new grain industry established by the Department of Agriculture during the last decade; the improvement of wheat and other grain crops; investigations of the grain sorghums and of rice culture; studies of the rusts, smuts, and other diseases affecting cereal crops; and experiments with dry land cereals, including the maintenance of cooperative testing farms in the West and Southwest. In close affiliation with the other work on grain crops, the Bureau is conducting corn investigations, with the objects of developing by breeding and selection greater yielding varieties of both field corn and sweet corn, and demonstrating among farmers the increased profits resulting from good cultural methods and careful seed selection.

Grains

Corn

Under the general heading of cotton breeding investigations the Bureau is conducting experiments and demonstrations in the development of early varieties of cotton for boll weevil sections, as well as long-staple races

and pedigreed strains of short-staple varieties for various conditions.

Cotton Breeding The objects are to obtain increased yield, longer and better fiber, earliness of maturity to prevent injury by the boll weevil, and to encourage among growers the cooperative breeding of cotton, careful seed selection, and improved cultural methods. Attention is also being given to the breeding of winter crops for cotton fields.

The tobacco investigations of the Bureau have for their objects the improvement, by breeding and selection, of cigar wrapper and filler tobaccos, smoking and export tobaccos, etc.; the improvement of farm practice and cultural methods with tobacco, including demonstrations of crop rotation in tobacco fields; the combat- Tobacco ing of the diseases of tobacco; the testing of the burn and other qualities of the new varieties of tobacco developed; and the securing of suitable cover crops for tobacco fields, such as vetches, oats, etc. In connection with this work, experiments in breeding rust-resistant asparagus are under way.

The Bureau is conducting sugar beet investigations with the object of developing single germ seed, improving cultural methods, determining the best fertilizers for sugar

Sugar Beets ar beets, the best methods of siloing seed beets, etc. The diseases

of the sugar beet, such as curly-top and leaf-spot, are being studied, and methods of their prevention are being worked out. The area of sugar beet culture is being extended,

and strains which will withstand alkali and drought are being secured by breeding and selection. Experiments are also being carried on in the development of high-grade strains of American-grown sugar beet seed.

PIONEER WESTERN AGRICULTURE

A considerable portion of the work of the Bureau is concerned with the upbuilding of a profitable agriculture in the arid and semi-arid parts of the West and Southwest, both on irrigated and unirrigated lands. Methods of dry land agriculture for the Great Plains Area are being devised, including crop rotations and methods of soil preparation; and stations at which the various problems encountered in farming under arid conditions may be studied have been established throughout the region. Similar investigations are under way on the lands recently brought under irrigation by the Reclamation Service of the Department of the Interior, this work being conducted in close cooperation with that Service. The agricultural possibilities of these lands are being studied, and crops suitable for cultivation thereon are being secured by adaptation or breeding. The alkali and drought resistant plant breeding investigations cover such crops as forage grasses, leguminous forage plants, millets, sorghum, Egyptian cotton, the date palm, olive, and pomegranate, in addition to the other crops previously referred to, such as sugar beets, cereals, etc. Special attention is being given to the adaptation of Egyptian cotton in the Southwest.

Dry
Land
Farming

Reclaimed
Land
Farming

Resistant
Plant
Breeding

The United States is a free country and we are not going to let anyone else tell us what to do. We are going to stand up for our rights and our freedom. We are going to fight for our country and our people. We are going to make sure that we are the best and the greatest nation in the world.

THE UNITED STATES OF AMERICA

On the 4th day of July, 1776, the United States of America declared its independence from Great Britain. This was a great day for the new nation, and it is a day that we all celebrate every year.

The United States is a country of many different people, but we all share the same values and the same dreams. We are a country of freedom, of justice, and of peace. We are a country that stands for the rights of every person.

Our country is a land of opportunity, where anyone can make a better life for themselves. We are a country that values hard work and determination. We are a country that believes in the power of the American dream.

Our country is a land of freedom, where everyone has the right to live as they see fit. We are a country that respects the rights of every person. We are a country that stands for the principles of liberty and justice under the law.

Our country is a land of peace, where we live in harmony with each other and with the world. We are a country that values peace and stability. We are a country that works to resolve our differences through dialogue and negotiation.

Our country is a land of progress, where we are always moving forward. We are a country that values innovation and creativity. We are a country that works to improve the lives of all our people.

Our country is a land of hope, where we believe in a better future for all. We are a country that works to create a more just and more equitable society. We are a country that believes in the power of the American dream.

Our country is a land of love, where we care for each other and for our community. We are a country that values compassion and kindness. We are a country that works to make the world a better place for everyone.

F A R M M A N A G E M E N T

The Bureau conducts farm management work in all parts of the country. A large part of the work is conducted by districts, each district including a group of States. In these districts object-lesson farms are conducted for the purpose of stimulating interest in the diversification of crops, improved methods of farm practice, etc. In the boll weevil

Farm Districts

territory the desirability of a wider diversification of crops is being demonstrated. Investigations of special phases of farming are being carried on throughout the United States, including studies of farm practice in maintaining soil fertility; in the culture of cereals, potatoes, and other crops; in the production of forage for beef cattle, hogs, and sheep; in the eradication of weeds; in hay production, and in various other phases of farming. Studies in the economics

Farm Practice

of farming are being made also, including farm accounts, records, equipment, etc., and the cost of all classes of farm operations. Systems

of farm bookkeeping are being worked out, in close correlation with all of the other farm management work. Investigations of methods of range management and of the value of species of cactus both for forage and for human food form another group of projects conducted in connection with the work on farm management. This work includes the improvement

Range Practice

of native pastures and the study of grasses and forage plants suitable for the grazing areas on the National Forests and for other purposes.

THE HISTORY OF THE

The history of the world is a vast and complex subject, encompassing the lives of countless individuals and the events that have shaped our planet. From the dawn of time to the present day, the human story is one of constant change and evolution. The study of history allows us to understand the forces that have driven progress and the challenges we have overcome. It is a discipline that seeks to uncover the patterns of human behavior and the impact of our actions on the world around us. The history of the world is not just a collection of facts and dates, but a narrative that connects the past to the present and offers insights into the future.

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FARMERS' COOPERATIVE DEMONSTRATION WORK

In the Southern States farmers' meetings and demonstration work are being conducted by the Bureau in cooperation with representative farmers and with local and State authorities.

The primary object of this work is to demonstrate in sections where the cotton boll weevil is present that a crop of cotton can be successfully and profitably grown under boll weevil conditions, and as a corollary to this proposition that the yield of cotton, corn, and other staple crops can be greatly increased by improved methods of cultivation. Similar work has been undertaken in the territory outlying the section invaded by the boll weevil. About one-half million southern farmers are now reached through this work, either by direct contact with the representatives of the Department or by means of community demonstration farms conducted under directions furnished by the Department. These demonstrations serve to awaken a great interest in improved methods of farming.

Extension of Work

P O M O L O G Y

The Bureau's work on fruits covers a wide diversity of problems connected with the fruit industry. Fruit marketing investigations are being conducted with the object of developing the export trade in peaches, apples, pomelos or grapefruit, pineapples, and other fruits; improving methods of packing and handling these fruits, with a view to insuring their delivery to consumers in attractive, sound, and wholesome condition; and improving the conditions of trans-Atlantic exportation in general.

Fruit Marketing

Fruit transportation and storage investigations are being carried on with the object of determining the factors which govern the successful shipping and keeping of perishable fruits; to bring about improvements, especially in packing house and refrigerator car practices; and to devise practical methods of farm fruit storage. These investigations are concerned with both citrus fruits and deciduous fruits, particularly in California and Florida. Fruit district investigations are being conducted by the Bureau, with a view to determining the adaptability of different varieties to the various orchard sections. This work has a direct bearing on the development of the fruit growing industry, as it aims to supply the fruit grower with accurate information regarding the adaptability of varieties. The adaptability of varieties to dry land conditions is being ascertained. Viticultural investigations are being carried on in various parts of the country, and have to do with the development of the Vinifera and the Rotundifolia grape industries, and the handling, keeping, marketing, and utilization of grapes and grape products. Pomological collections are maintained in connection with the fruit investigations of the Bureau.

H O R T I C U L T U R E

In addition to the work on fruits, the Bureau conducts various horticultural investigations, especially with reference to the truck growing industries. On the Arlington estate, in Virginia, the Bureau maintains, as author-

ized by law, an experimental farm for the testing of varieties of seeds and plants, especially vegetables and flowers. The horticultural work on the Farm includes tests of Irish potatoes, sweet potatoes, and other vegetables; ex-

periments in the growing of vegetables and flowers under shade: and various other work of the different branches of the Bureau. Investigations of the Bermuda onion and other truck crop industries are being conducted in connection with the Farm, a comprehensive truck crop survey being a feature. On the Farm, as well as at other points, the Bureau carries on tests of new varieties of vegetables introduced into the seed trade. In the greenhouses of the Department, which are maintained under the supervision of the Bureau, experiments are being conducted in the growing of tomatoes under glass; the improvement of lettuce, celery, and other vegetables; and the hybridization of carnations, chrysanthemums, dahlias, roses, and other flowering plants. Experiments in the growing of Bermuda lilies from seed, as well as in the growing to tulip, hyacinth, and other Dutch bulbs which are now imported into the country, are being carried on by the Bureau in various sections of the country.

Vegetables

Floriculture

PURCHASE AND DISTRIBUTION OF SEEDS

The Bureau introduces from foreign countries rare and valuable seeds and plants for propagation and testing in various parts of the United States. Agricultural explorers are searching different parts of the world for new seeds and plants needed for different sections of this country. Among the valuable new plant

industries so established may be mentioned durum wheat, the date palm, disease-resistant varieties of rice, etc. In connection with this work the Bureau maintains plant introduction and testing gardens at various

Plant points. Among the plants now under
Intro- experiment are matting rushes, bam-
duction boos, mangos, root crops, forage
 crops, and vegetables. Scions of
 these varieties are distributed to cooperators
 throughout the country for testing. In con-
 nection with the seed distribution, forage
 crop investigations are being carried on by
 the Bureau, having for their objects the ex-
 tension of the range of cultivation of stand-
 ard varieties of forage crops and the intro-
 duction and adaptation of new and improved va-
 rieties. Among the latter are the
 Turkestan and Arabian alfalfas, and Forage
 also a new Siberian alfalfa. Varie- Crops
 ties of sorghum, grasses, and legum-
 inous soil-improving crops are being
 tested, as is the value of commercial fertil-
 izers and soil inoculation. Cooperation with
 individual farmers is practiced extensively.

The Congressional distribution of seeds and
 plants devolves upon the Bureau of Plant In-
 dustry, and entails annually the packeting,
 assembling, and mailing of many million pack-
 ets of vegetable and flower seeds, as well as

the sending out of other varieties
Seed of seeds and plants. In addition
Distri- to the regular distribution, a lim-
bution ited quantity of seed of select va-
 rieties of cotton, tobacco, and
 other crops is sent to farmers in

regions where improved varieties are in great-
 est demand. The distribution of seeds to
 schools and the encouragement of school garden
 work are also features of the seed distribution.

The lines of investigation referred to in the preceding pages are conducted by the investigators whose names appear in the following list.

ALPHABETICAL LIST OF INVESTIGATORS

Description, Location, and Cost of Their Work

ALLARD, H. A. Assistant in cooperative cotton breeding investigations in Georgia. See Shamel.

ALLEN, EDWARD R. Assistant in soil bacteriology. See Kellerman.

ALSBERG, CARL L. Expert in chemical biology, Drug and Poisonous Plant Investigations. Engaged in laboratory investigations of the poisonous action on horses, cattle, sheep, and other domestic animals of the loco weeds, larkspurs, Zygadenus (death camas), lupines, sleepy grass, mistletoe, and other plants reputed to be poisonous. The work is performed in the laboratory at Washington, D. C., in conjunction with the field investigations of Dr. C. Dwight Marsh (which see). The object of the work is to isolate and determine the active principles of poisonous plants with the view of securing knowledge which will suggest practical methods of treating poisoning in animals and avoid the serious losses occurring from this source under present conditions. Information concerning the stages at which the plants are most poisonous is also being sought. In connection with the Drug Plant Investigations of the Bureau work is being carried on in the physiological testing of American-grown drug plant products. Ex-

The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations

$$\begin{aligned} & \frac{dx}{dt} = f(x, y, z), \\ & \frac{dy}{dt} = g(x, y, z), \\ & \frac{dz}{dt} = h(x, y, z), \end{aligned}$$

where f, g, h are continuous functions of x, y, z in a domain D of the three-dimensional space.

It is shown that if the functions f, g, h satisfy certain conditions, then the system has a unique solution in D .

The second part of the paper is devoted to a study of the properties of the solutions of the system. It is shown that if the functions f, g, h are periodic with respect to x, y, z , then the solutions are also periodic. It is also shown that if the functions f, g, h are bounded, then the solutions are bounded.

The third part of the paper is devoted to a study of the stability of the solutions of the system. It is shown that if the functions f, g, h satisfy certain conditions, then the solutions are stable.

The fourth part of the paper is devoted to a study of the asymptotic behavior of the solutions of the system. It is shown that if the functions f, g, h satisfy certain conditions, then the solutions approach a certain limit as $t \rightarrow \infty$.

The fifth part of the paper is devoted to a study of the bifurcation of the solutions of the system. It is shown that if the functions f, g, h satisfy certain conditions, then the solutions bifurcate at certain points.

Alsberg, Carl L.--Continued.

penses this year, about \$4,500, of which \$3,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

AMES, ADELINE. Assistant in plant disease survey. See Orton.

AYRES, T. W. Assistant in orchard spraying demonstrations. See Scott.

BAILEY, CLYDE M. Assistant in grain standardization, Fargo, N. Dak. See Fitz.

BAIN, S. M. Special agent, Cotton Breeding Investigations. Engaged in breeding cottons for Tennessee and Arkansas, cotton seed of greater oil content, etc. Work is being conducted at Knoxville, Cades Cave, and Warren, Tenn., and at Clarendon, Ark. Cooperation with the Tennessee Experiment Station is in effect. The objects of the work are to secure early maturing cottons which will escape boll weevil injury; to produce varieties richer in oil; and to ascertain the effect of altitude and concomitant climatic factors on pedigreed strains of cotton. Expenses this year, about \$3,300, of which \$2,300 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

BALL, CARLETON R. Agronomist, Grain Investigations. Engaged in investigations of grain sorghums. Work is being conducted chiefly in the Great Plains Area, at Dickinson, N. Dak.; Bellefourche, S. Dak.; North Platte, Nebr.; Hays, Kans.; Akron, Colo.; Stillwater, Okla.; Nephi, Utah; Agricultural College, N. Mex.; and at Amarillo and Dalhart, Tex. Cooperation with the State experiment stations

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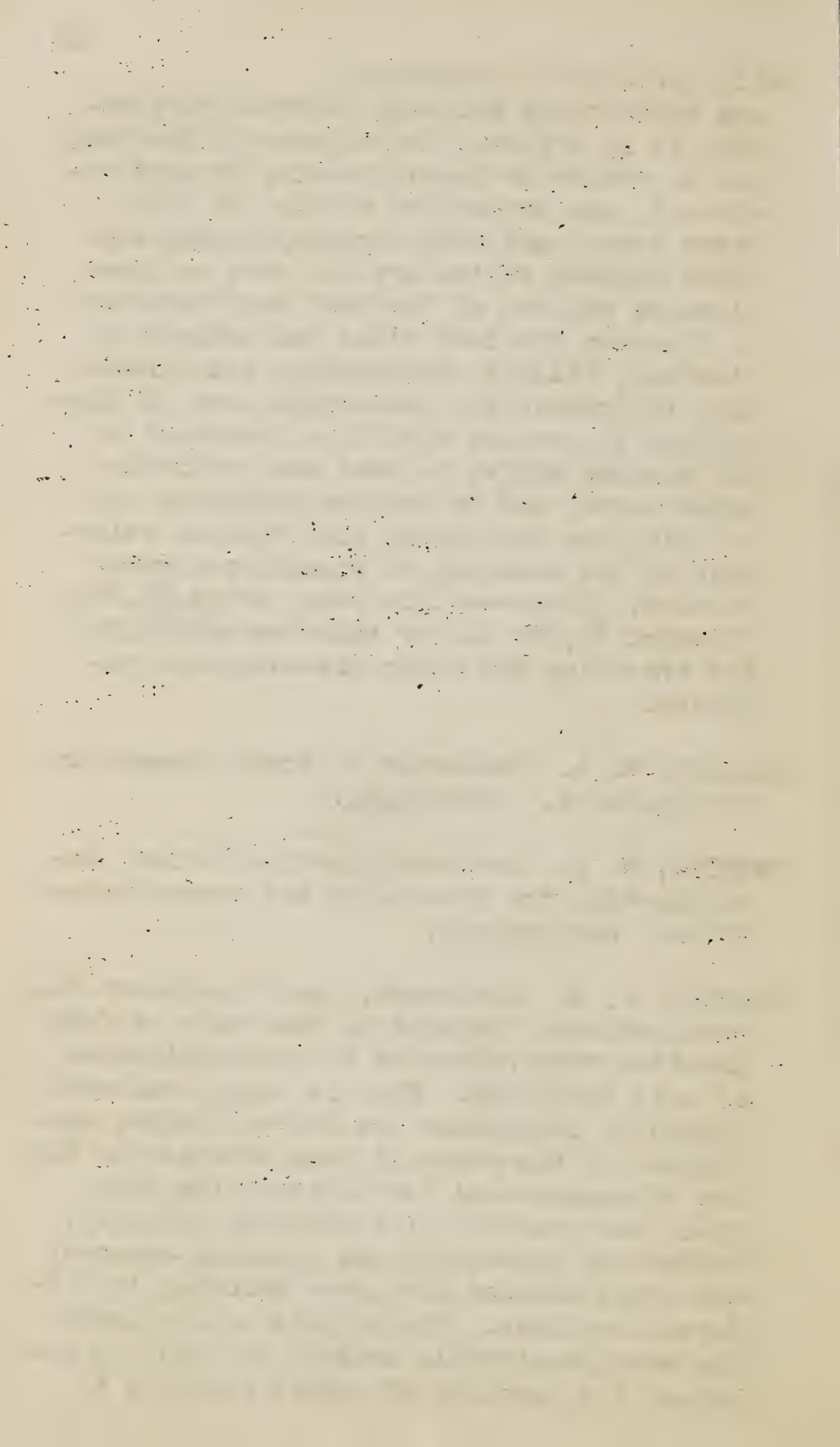
Ball, Carleton R.--Continued.

and substations and with selected co-operators is in effect. The objects of the work are to secure or develop early, drought resistant, and productive strains of milo, kaffir corns, and other grain-yielding sorghums adapted to the dry and more or less elevated regions of the West and Southwest; to discover the best times and methods of planting, tillage, harvesting, and threshing; to promote the commercial uses of these grains; to produce varieties resistant to the sorghum midge; to test new or little known sorts; and to improve varieties by breeding and selection, with special reference to the securing of drought resistant strains. Expenses this year, about \$3,500, of which \$2,500 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

BALLARD, W. S. Assistant in fruit disease investigations. See Waite.

BEATTIE, W. R. Assistant horticulturist, investigating the truck crop and peanut industries. See Corbett.

BEAVERS, J. C. Assistant, Farm Management Investigations. Engaged in the study of farm practice with reference to the maintenance of soil fertility. Work is being conducted generally throughout the United States, consisting of the study of farm practice in the use of manures and fertilizers; the time, kind, and quantity of fertilizer to apply; methods of preserving and applying manures; and crops adapted for green manuring in different sections. The objects are to learn the most practicable methods of handling manures; the quantity of manure required to



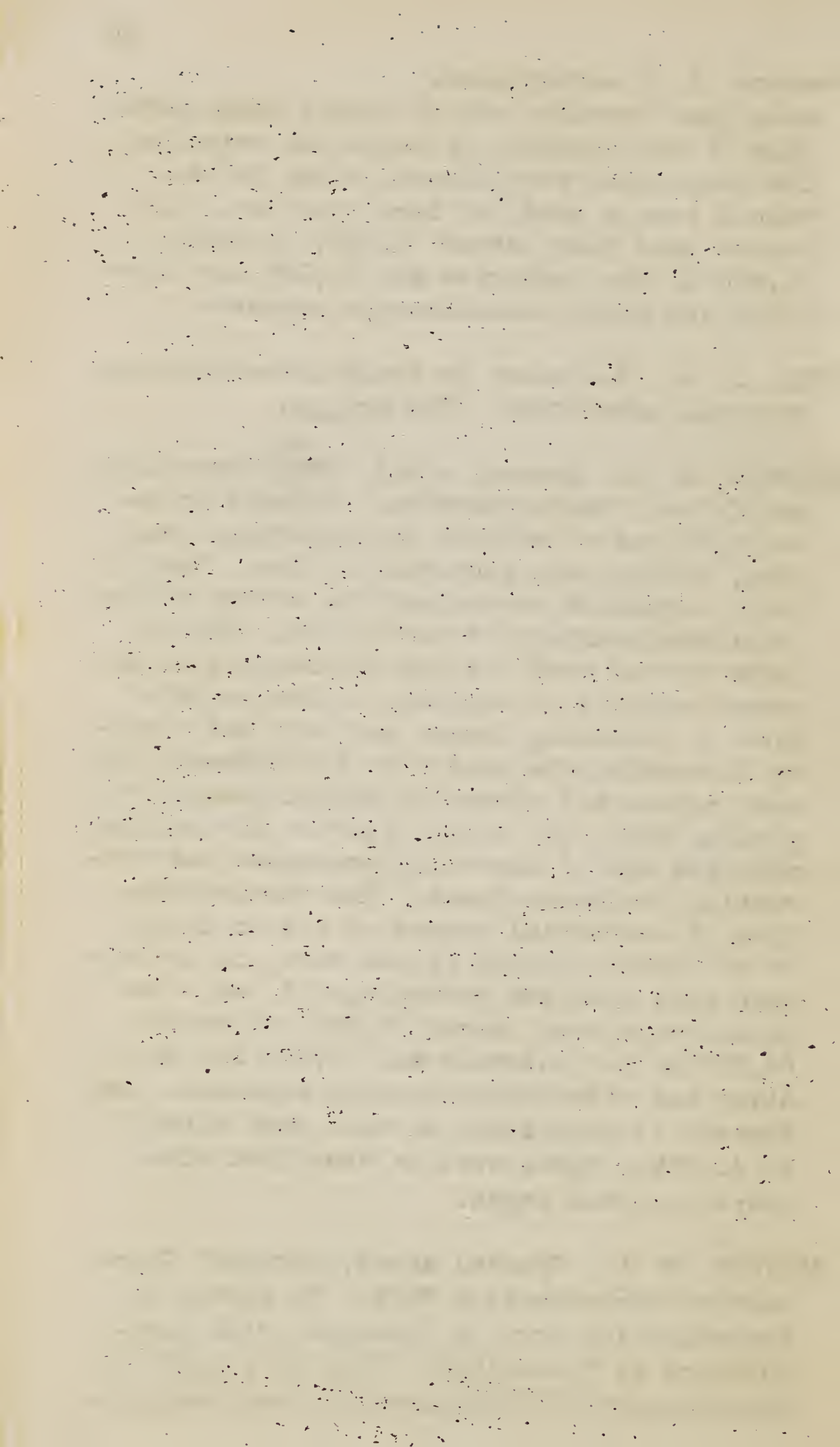
Beavers, J. C.--Continued.

keep land fertile; and to secure such knowledge of the relation of soils and crops to the commercial fertilizers as can be obtained from a study of farm practice. Expenses this year, about \$3,000, of which \$1,800 is for salaries and \$1,200 for traveling and other miscellaneous expenses.

BELZ, J. O. Assistant in field investigations, Physical Laboratory. See Briggs.

BENNETT, R. L. Special agent, Crop Technology and Cotton Standardization. Engaged in investigations of methods of preparing, ginning, baling, and marketing cotton. Work is being conducted throughout the cotton States, with headquarters at Paris, Tex. The objects of the work are the development of improved methods of handling cotton, with a view to lessening damage and cost and thereby increasing the profit to the farmer. The work covers all phases of cotton damage from picking until the cotton reaches the spinner, with the aim of improving processes and correcting faults as found. The standardization of commercial grades of cotton is one of the chief objects of the work, in accordance with specific provisions of law. Expenses this year, about \$7,500, of which \$4,500 is for salaries and \$3,000 for traveling and other miscellaneous expenses. Dr. Bennett is associated in this work with Dr. N. A. Cobb, whose work is described elsewhere in these pages.

BENTLEY, W. D. Special agent, Farmers' Cooperative Demonstration Work. In charge of demonstration work in Oklahoma, with headquarters at Tishomingo. This is a part of the cooperative demonstration work conducted



Bentley, W. D.--Continued.

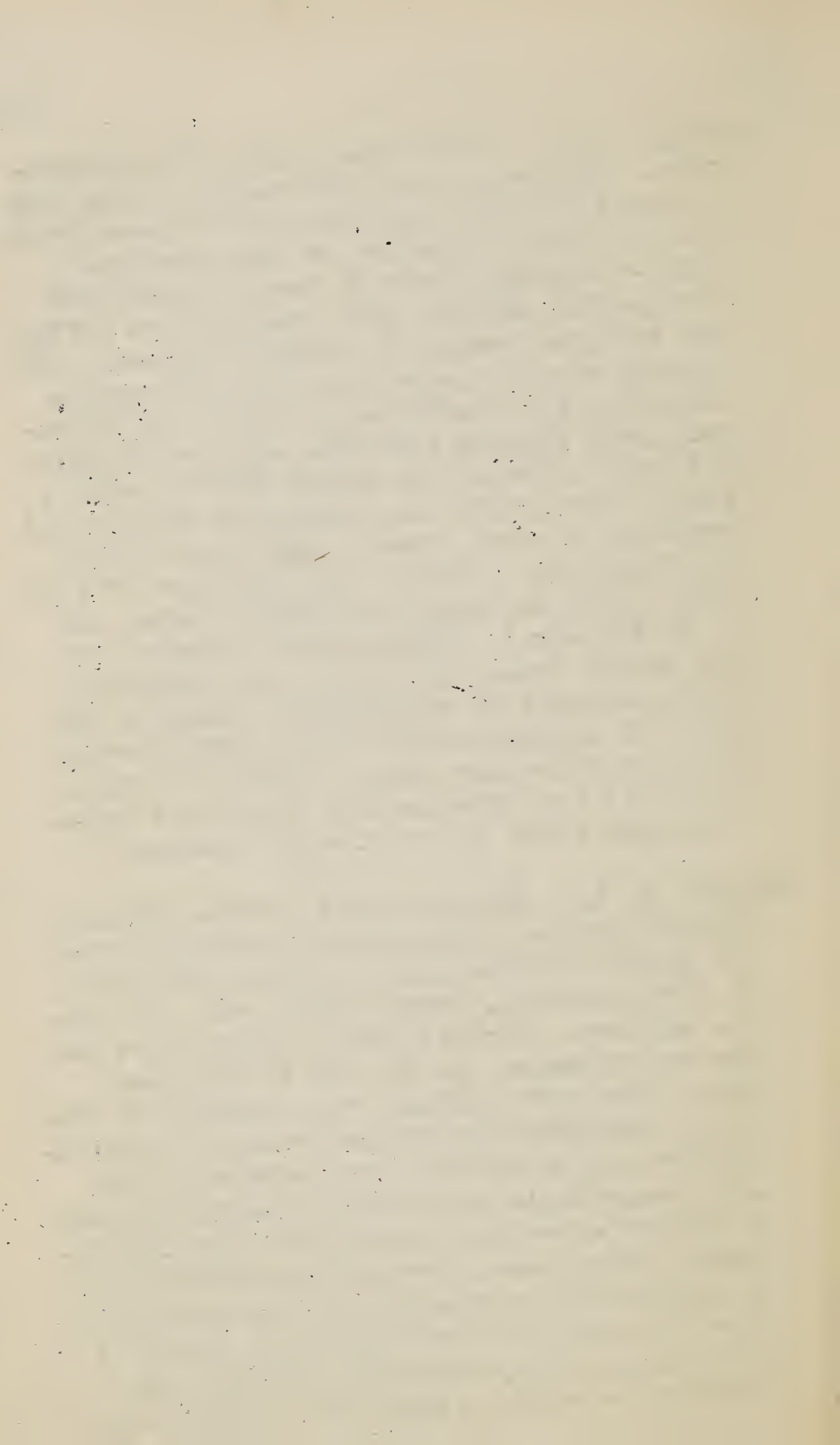
under the direction of Dr. S. A. Knapp, the objects being the encouragement of the diversification of crops, the improvement of cultural methods and of systems of farm management in sections invaded by the cotton boll weevil or in which it would seem that the boll weevil is likely soon to appear. The main aim of the work is simply to bring to the attention of the farmer plain and practical methods of bettering his condition, improving his soil, and growing larger crops. The people are reached largely by personal contact with representatives of the Department. This general propaganda has met with great and continued success, showing the difference in actual money returns from farms handled by the old methods and from farms handled on the newer plans. Expenses this year in Oklahoma, about \$12,000, of which \$9,500 is for salaries and \$2,500 for miscellaneous field expenses. Mr. Bentley is assisted by a corps of field agents.

BILLINGS, G. A. Assistant, Farm Management Investigations. Engaged in the study of crop systems and methods of management on dairy farms. Work is being conducted generally throughout the United States. The objects are to determine the best cropping systems for dairy farms of different types and in different sections of the country and to ascertain the best methods of management on dairy farms. Much of this work is being carried on in Pennsylvania and New Jersey. Expenses this year, about \$4,000, of which \$2,500 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

BLANCHARD, H. F. Assistant agronomist in California grain experiments. See Carleton.

BOERNER, E. G. Assistant, Grain Standardization. Engaged in the examination of cargoes of American grain arriving at European ports. Work is being conducted at the principal grain-receiving ports of Great Britain and Continental Europe, with headquarters during the shipping season at London, England. The objects are to secure definite information regarding the condition on arrival of American grain shipped from the various Atlantic and Gulf ports of the United States, with a view to improving the commercial grading and handling of corn, wheat, oats, rye, barley, and flaxseed. Much of the complaint of foreign buyers is based on damaged grain, and it is the aim to eliminate this feature of our export trade by studying and improving the conditions of handling the grain at the ports of shipment and also in ocean transit. Expenses this year, about \$4,000, of which \$2,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses.

BOYKIN, E. B. Special agent, Cotton Breeding Investigations. Engaged in breeding cottons for South Carolina and in testing the value of fertilization, cover crops, etc., in cotton culture. Work is being conducted at Lamar and Columbia, S. C., and at Ittabena, Miss. The work includes the breeding of cotton to increase the productiveness of the varieties and to develop more productive Upland long-staple varieties; breeding cowpeas to secure a variety adapted for planting between cotton rows; testing the advisability of fertilizing cotton during the growing period according to the Williamson method of fertilizing corn; the value of vetch for planting in cotton fields as a winter crop;



Boykin, E. B.--Continued.

and the effect on the quantity of lint cotton of holding seed cotton in bulk for a period before ginning. Attention is also being given to the encouragement of the selection of cotton by individual farmers. Expenses this year, about \$5,000, of which \$2,200 is for salaries and \$2,800 for traveling and other miscellaneous expenses.

BRACKETT, G. B. Pomologist in charge of Pomological Collections. Work is conducted in or near Washington, D. C., and includes the collection and dissemination of information pertaining to fruit culture in all its phases; the simplification of fruit nomenclature; the identification of varieties; and the preservation of types by means of description, models, paintings, and specimens. Matters pertaining to practical methods of fruit growing and to the development of the industry throughout the United States are receiving attention. Expenses this year, about \$18,000, of which \$17,000 is for salaries and \$1,000 for supplies and other miscellaneous expenses. Mr. Brackett is assisted by Messrs. W. H. Ragan and W.N.Irwin.

BRAND, CHARLES J. Physiologist, Plant Life History Investigations. Engaged in life history investigations of alfalfa and clover. Work is being conducted in cooperation with the experiment stations and farmers in Arizona, California, Colorado, Florida, Hawaii, Idaho, Illinois, Indiana, Kansas, Kentucky, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Dakota, Ohio, Oregon, Rhode Island, South Dakota, Tennessee, Texas, Utah, Virginia, and Wisconsin, and also in Canada. The work has for its objects the investigation of the life history of alfalfa.

The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, which are based on the principles of wave mechanics. The second part of the paper is devoted to a discussion of the experimental results obtained in the study of the structure of the atom. It is shown that the experimental results are in good agreement with the theoretical predictions of quantum mechanics.

The third part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of matter. It is shown that the theory of the structure of the atom can be used to calculate the properties of matter, such as the density, the refractive index, and the specific heat. The fourth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of light. It is shown that the theory of the structure of the atom can be used to calculate the properties of light, such as the wavelength, the frequency, and the intensity.

The fifth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the nucleus. It is shown that the theory of the structure of the atom can be used to calculate the properties of the nucleus, such as the mass, the charge, and the spin. The sixth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the elementary particles. It is shown that the theory of the structure of the atom can be used to calculate the properties of the elementary particles, such as the mass, the charge, and the spin.

The seventh part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the universe. It is shown that the theory of the structure of the atom can be used to calculate the properties of the universe, such as the density, the temperature, and the expansion rate. The eighth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the human body. It is shown that the theory of the structure of the atom can be used to calculate the properties of the human body, such as the density, the temperature, and the expansion rate.

The ninth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the future. It is shown that the theory of the structure of the atom can be used to calculate the properties of the future, such as the density, the temperature, and the expansion rate. The tenth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the past. It is shown that the theory of the structure of the atom can be used to calculate the properties of the past, such as the density, the temperature, and the expansion rate.

Brand, Charles J.--Continued.

and red clover, with special reference to their heat, moisture, aeration, nutrition, pollination, and cultural requirements, with a view to discovering drought-resistant varieties for the semiarid portions of the West and hardy varieties for the colder sections of the United States; and also to determine the effect of change of seed, the regions where seed production can be carried on most profitably, and from what sources farmers in various States can secure seed most likely to succeed under their conditions. Expenses this year, about \$5,000, of which \$3,500 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

BREWER, JAMES F. Artist and assistant, Laboratory of Plant Pathology. See Smith, E. F.

BRIGGS, LYMAN J. Physicist in charge of Physical Laboratory. The Physical Laboratory is charged with the investigation of the physical and physiological factors which influence the growth of crops, and with the devising of instruments and methods for the quantitative measurement of such factors. Especial attention is being given to the influence of different cultivation methods on the conservation of moisture in the semiarid regions. Field work along this line is being conducted at Amarillo and Dalhart, Tex.; Hays and Garden City, Kans.; Akron, Colo.; North Platte, Nebr.; Bellefourche, S. Dak.; Edgeley and Dickinson, N. Dak.; and Moore, Mont., in cooperation with the office of Dry Land Agriculture Investigations (see Chilcott); and at Nephi, Utah, in cooperation with the office of Grain Investigations (see Jardine). Experiments to determine the influence of electricity on

Briggs, Lyman J.--Continued.

the growth of truck crops are being conducted at the Arlington Experimental Farm in cooperation with the office of Plant Life History Investigations (see Swingle); and experiments to determine the best method of checking the development of root-rot (*Thielavia*) on tobacco in the field are being carried on at Suffield, Conn., in cooperation with the office of Tobacco Investigations (see Shamel). Expenses this year, about \$16,000, of which \$9,700 is for salaries and \$6,300 for traveling and other miscellaneous expenses. Dr. Briggs is assisted by Messrs. J. O. Belz, J. W. McLane, and Miss Julia R. Pearce.

BRODIE, D. A. Assistant agriculturist, Farm Management Investigations. In general charge of work in farm management districts, of which eleven have been organized, each district including one or more States. This work consists of a study of the types of farming prevailing in each district and the general results secured from each type; the cropping systems used on farms of different types; and the adaptability of different types of farming to the particular region. Attention is also given to local conditions with reference to the amount, kind, and character of available farm labor and to market conditions; to the adaptability of crops to local conditions of soil and climate; to methods of crop and stock management; to the equipment used on farms of various types, including a study of the machinery, live stock, buildings, fences, and other requirements for successful work. Attention is also devoted to local methods of tillage; and a detailed study of the systems of management in vogue on successful farms

Brodie, D. A.--Continued.

is a leading feature of the work. A part of the work also consists in conducting object-lesson farms and demonstrations on special phases of farming in cooperation with State authorities. In the cotton States, where four of the eleven districts are located, the work has a special bearing on the boll weevil problem, the advisability of the diversification of crops being demonstrated to cotton growers. Expenses this year in supervisory phases of this work, about \$7,000, of which \$5,400 is for salaries and \$1,600 for traveling and other miscellaneous expenses. The expenses in each of the eleven districts, as well as the States embraced by each district, are mentioned opposite the names of the assistants conducting the work, namely, Messrs. Crosby, Dodge, Drake, Goodrich, Hunter, McDowell, McNair, Miller, Warren, and Youngblood.

BROWN, D. E. Special agent, Maryland tobacco investigations. See Mathewson.

BROWN, EDGAR. Botanist in charge of Seed Laboratory. Work covers the examination of seeds for the presence of adulterants, in accordance with law; making tests of seeds for farmers and others in regard to germination and mechanical purity; the preparation and distribution of authentic sets of seeds of weeds and economic plants; and propaganda work with a view to popularizing seed testing. About 25,000 samples of seeds are tested annually. Improved methods of testing and handling seeds are being worked out, and investigations of the effect of climate and other factors on the vitality of seeds are being carried on. Cooperative seed testing laboratories are maintained at Lin-

Brown, Edgar--Continued.

coln, Nebr., and Columbia, Mo., in cooperation with the State experiment stations at those points. Expenses this year, about \$25,000, of which \$20,000 is for salaries and \$5,000 for traveling and other miscellaneous expenses. Mr. Brown is assisted by Messrs. F. H. Hillman and W. L. Goss.

BROWN, ERNEST B. Assistant in corn investigations and sweet corn breeding. See Hartley.

BROWN, NELLIE A. Assistant in laboratory studies of diseases of the sugar beet and other plants. See Townsend.

BURNETT, L. C. Special agent in oat breeding, Grain Investigations. See Warburton.

BURR, W. W. Assistant in dry land agriculture investigations, North Platte, Nebr. See Chilcott.

BURRITT, M. C. Assistant, Farm Management Investigations. See Dodge.

BUTTERFIELD, EARL C. Assistant horticulturist, Arlington Experimental Farm. See Corbett.

BYRNES, E. M. Superintendent, Gardens and Grounds. Work includes the care and ornamentation of the Department grounds, maintenance of greenhouses and trial grounds for experimental purposes, and the propagation and handling of plants for Congressional and special distribution. Facilities for horticultural work are provided for the various offices of the Bureau, a complete range of greenhouses being maintained. Experimental

Byrnes, E. M.---Continued.

work with carnations and other florists' crops and with vegetables is being conducted. Expenses this year, including care of Department grounds, about \$40,000, of which \$30,000 is for salaries of gardeners, mechanics, etc., and \$10,000 for the miscellaneous expenses of maintenance.

CAMPBELL, J. P. Special agent, Farmers' Co-operative Demonstration Work. See Knapp.

CARLETON, M. A. Cerealist in charge of Grain Investigations. Personally engaged in the establishment of the durum wheat, emmer, preso, and other new grain industries; the improvement of wheat, winter grains, oats, and other cereal crops; and experiments in crop rotation, the influence of climate and soil on the quality of grains, and in methods of cultivating and harvesting. This work is being conducted at Fargo, N. Dak.; Brookings, S. Dak.; McPherson, Kans.; Lincoln, Nebr.; Madison, Wis.; St. Paul, Minn.; Ames, Iowa; College Park, Md.; Knoxville, Tenn.; and at Ceres and Davisville, Cal. Close cooperation with the State experiment stations is in effect. The objects of the work are the production of pure types of durum and other wheats, improved oat varieties, and to determine the effect of growing leguminous crops in rotation with cereals. The establishment of emmer as a crop for stock feeding and of preso and other grain millets is also a part of the work. Expenses this year in these lines of work, about \$13,000, of which \$10,500 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Mr. Carleton is assisted by Messrs. H. F. Blanchard, H. J. C. Umberger, and V. L. Cory.

Carleton, M. A.--Continued.

The investigations of Messrs. Ball, Derr, Jardine, Johnson, Ross, and Warburton, described elsewhere in these pages, are directed by Mr. Carleton.

CARROLL, W. P. Assistant, Grain Standardization. In charge of grain standardization laboratory, Chicago, Ill. The work at this, as well as at all the other field laboratories, consists in the examination of samples of commercial grain passing through the local markets, in order to determine the percentage of moisture, dirt, shriveled grain, sound grain, damaged grain, etc. The object is to obtain information and data which will enable the Department of Agriculture to establish uniform standard grades for all classes of commercial grain--corn, wheat, oats, rye, barley, flaxseed, etc. The laboratory was established at Chicago for the reason that it is the largest primary grain market in the world and affords especially good facilities for studying questions in connection with the grain business generally. The work at this laboratory has the support of the Chicago Board of Trade. Expenses this year, about \$8,000, of which \$5,000 is for salaries and \$3,000 for traveling and other miscellaneous expenses of maintenance.

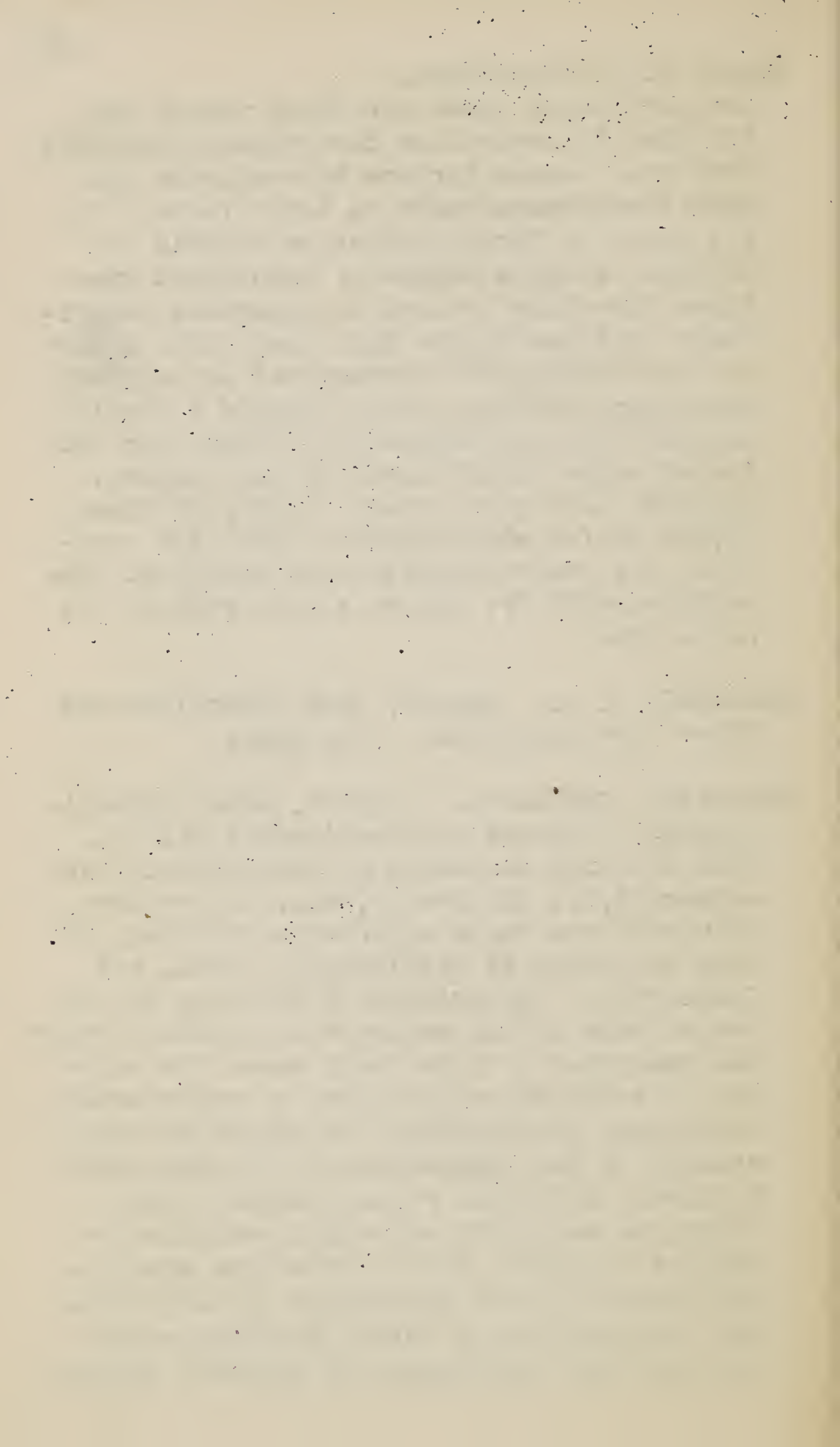
CATES, J. S. Assistant, Farm Management Investigations. Engaged in studies of farm practice with reference to tillage and to the eradication of weeds. Work is being conducted generally throughout the United States, and demonstrations in the eradication of Johnson grass are being carried on in the South. Methods of exterminating charlock, nut grass, quack grass, wild on-

Cates, J. S.—Continued.

ion, and other weeds are being worked out, in order to secure and disseminate knowledge that will enable farmers to eradicate the most troublesome weeds on their farms. In the study of farm practice in methods of tillage, a large number of experiment stations have been induced to undertake experiments outlined by the Department with a view to ascertaining the fundamental principles underlying tillage, and to obtain a knowledge of the best methods of tillage for different crops in all parts of the country. Expenses this year, about \$7,500, of which \$4,500 is for salaries and \$3,000 for traveling and other miscellaneous expenses. Associated with Mr. Cates in this work is Mr. H. E. Cox.

CHAMBERS, W. E. Expert, Crop Technology and Fiber Investigations. See Cobb.

CHAMBLISS, CHARLES E. Expert, Grain Investigations. Engaged in rice investigations. Work is being conducted at Crowley, La.; Jacksonboro, S.C.; and Lonoke, Ark., in cooperation with the State experiment stations; and also at points in Mississippi, Texas, and California. The objects of the work are to secure data on the comparative yielding power and qualities of rice grown under the methods of cultivation practiced in southwestern Louisiana; to determine the effect of environment on the composition of Carolina Gold, Honduras, and Japan rices planted in the South; to secure by selection varieties resistant to blast; and to determine the possibilities of rice production in California. The introduction of better yielding varieties and the improvement of cultural methods



Chambliss, Charles E.--Continued.

for rice are also objects sought. Expenses this year, about \$2,500, of which \$2,000 is for salaries and \$500 for traveling and other miscellaneous expenses.

CHARLES, VERA K. Assistant, Pathological Collections. See Patterson.

CHASE, AGNES. Assistant in systematic agrostology. See Hitchcock.

CHILCOTT, E. C. Agriculturist in charge of Dry Land Agriculture Investigations. Work is being conducted in the Great Plains Area, bounded by the 98th meridian on the east and the 5,000-foot contour line east of the Rocky Mountains on the west, and by the 32d and 49th parallels, covering about 330,000 square miles. The work is located at Williston, Dickinson, and Edgeley, N.Dak.; Bellefourche, S.Dak.; North Platte, Nebr.; Hays and Garden City, Kans.; Akron, Colo.; Amarillo and Dalhart, Tex.; and at Utica, Mont. Close cooperation with the State experiment stations of Montana, North Dakota, Nebraska, Kansas, and Colorado is in effect. The objects of the work are to determine the best methods of crop rotation, the most suitable crops, and the cultural methods best suited for the conservation of moisture and humus, with a view to the betterment of agricultural conditions and practices in the Great Plains Area. The chief crops under experiment are cereals, grasses and forage plants, peas, potatoes, etc. Expenses this year, about \$33,000, of which \$20,000 is for salaries and \$13,000 for traveling and other miscellaneous expenses. Prof. Chilcott is assisted by Messrs. John S. Cole, C. A. Jensen, J. M. Stephens, F. L. Kennard, J. E. Payne,

Chilcott, E. C.--Continued.

and W. W. Burr. Messrs. C. S. Scofield, L. J. Briggs, T. H. Kearney, W. M. Jardine, and Karl F. Kellerman, whose work is described elsewhere in these pages, are each engaged upon special problems in cooperation with Prof. Chilcott.

CHISOLM, FREDERIC F. Expert, Foreign Seed and Plant Introduction. See Fairchild.

CLARKE, FRED W. Assistant in matting plant investigations, Foreign Seed and Plant Introduction. See Fairchild.

COBB, N. A. Crop technologist in charge of Crop Technology and Fiber Investigations. Personally engaged in laboratory studies of the biology of grain breeding and milling; the development of improved apparatus and methods of standardizing grain and cotton, improved machinery for the work in dry land agriculture, and the improvement of technological methods in other lines of investigation carried on by the Bureau. In cooperation with the Forest Service, tests of various plants as to their suitability for conversion into paper are being made. Trials of possible new sources for fabrics and papers are being conducted. Expenses this year in these phases of the work, about \$7,500, of which \$6,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses. Dr. Cobb is assisted by Mr. W. E. Chambers. The investigations of Messrs. Bennett and Dewey, described elsewhere in these pages, are conducted in close association with those of Dr. Cobb.

- COCKE, R. P. Special agent, Virginia tobacco investigations. See Mathewson.
- COLE, JOHN S. Expert and field assistant, Dry Land Agriculture Investigations. See Chilcott.
- COLLINS, G. N. Assistant botanist, Bionomic Investigations of Tropical and Subtropical Plants. See Cook.
- CONNER, A. B. Assistant, Forage Crop Investigations. See Piper.
- COOK, O. F. Bionomist in charge of Investigations of Tropical and Subtropical Plants. Chief attention is being devoted to cotton and corn, field experiments with these crops being under way at Brownsville, Del Rio, Falfurrias, Kerrville, Moore, San Angelo, San Antonio, and Victoria, Tex.; Yuma, Ariz.; Fallon, Nev.; Chico and Los Angeles, Cal.; Winfield and Stockton, Kans.; and Lanham, Md. The objects of the work are to determine and apply the general physiological factors which control the growth of the principal crop plants which originated in tropical countries. Improved methods of acclimatization and breeding are being developed, to facilitate the introduction of varieties adapted to special purposes and conditions. Central American varieties of cotton resistant to the boll weevil are being acclimatized in the South, as well as drought-resistant varieties, in order to extend cotton culture into the drier regions where the weevils are less injurious. Experiments are being made with Central and South American varieties of corn adapted to special conditions of moisture, drought, and irrigation, to acclimatize them

Cook, O. F.--Continued.

in parts of the South and West where our present varieties do not thrive. Tropical crops receiving incidental attention in the work are rubber and rubber substitutes, cacao, coffee, the mango, avocado, banana, chayote, etc. Expenses this year, about \$20,000, of which \$16,000 is for salaries and \$4,000 for traveling and other miscellaneous expenses. Mr. Cook is assisted by Messrs. G. N. Collins, H. Pittier, F. L. Lewten, J. H. Kinsler, C. B. Doyle, Argyle McLachlan, and R. M. Meade.

CORBETT, L. C. Horticulturist in charge of Arlington (Virginia) Experimental Farm and Truck Crop Investigations. Work at Arlington Farm includes the general supervision and improvement of the farm; maintenance of a model fruit garden and kitchen garden; tests of vegetables and flowers; a study of the influence of heat, light, and moisture on greenhouse crops; a quantitative investigation of the transpiration of economic plants; the maintenance of variety orchards of the apple and peach; and a collection of hardy herbaceous and woody plants. Truck crop investigations contemplate a comprehensive truck crop survey of the United States. At present the work is chiefly confined to the Eastern States, especially those bordering the Atlantic coast--Vermont, New York, New Jersey, Virginia, North Carolina, South Carolina, and Georgia; and also in Kentucky, Ohio, Alabama, Tennessee, Texas, Indiana, Michigan, Colorado, and California. The principal work is located at Mattituck, Long Island, N.Y.; Meggett, S.C.; Suffolk, Va.; and at the Virginia Truck Experiment Station, near Norfolk, which is maintained in cooperation with the Virginia Agricultural Experiment Station. The work

Corbett, L. C.--Continued.

is in the form of field demonstrations and experiments in cooperation with growers. The objects are the general improvement of cultural methods and the dissemination of desirable varieties. A study of market conditions is being made, for the improvement of methods of packing, handling, and shipping; also a study of cooperative production and harvesting. An investigation of the adaptability of potatoes to different sections is being made; as well as a study of the culture and production of melons, onions, celery, sweet potatoes, cabbage, beets, spinach, cauliflower, asparagus, horseradish, and water cress. Work with peanuts is being conducted in the South and West, the objects being the improvement of cultural methods; demonstrations of the uses of peanuts as stock food; and a study of the harvesting, marketing, and uses of peanuts. An investigation of the influence of fertilizers on the yield and maturity of various truck crops and of the effect of certain truck farm practices on the maintenance of crop production is also under way. Expenses this year: Arlington Farm, \$25,000, of which \$20,000 is for salaries, hiring of labor, etc., and \$5,000 for miscellaneous expenses of maintenance. Truck Crop Investigations, \$11,000, of which \$8,500 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Prof. Corbett is assisted on the Arlington Farm by Messrs. Earl C. Butterfield, W. V. Shear, and John H. Tull; and in the work on truck crops by Messrs. W. R. Beattie and Guy L. Stewart; and he is associated with Prof. W. W. Tracy, Sr., in the testing and improvement of vegetable varieties; and with the office of Seed Distribution in school garden work.

CORY, V. L. Assistant in adaptation experiments, Grain Investigations. See Carleton.

COTTON, J. S. Assistant, Farm Management Investigations. Engaged in studies of farm practice in the production of forage for beef cattle and sheep. Work is being conducted generally throughout the United States, the objects being to ascertain the best cropping systems for farms producing beef cattle and sheep. Some attention is also being given to a study of the methods used by feeders at sugar factories in feeding sugar beet pulp to cattle, to obtain a knowledge of the value of sugar beet pulp as a feed for cattle, and of the best methods of feeding it. Expenses this year, about \$6,500, of which \$3,500 is for salaries and \$3,000 for traveling and other miscellaneous expenses. Associated with Mr. Cotton in this work is Mr. D. H. Doane.

COVILLE, FREDERICK V. Botanist in charge of Taxonomic and Range Investigations. Work is conducted in Washington, D. C., supplemented by field studies where necessary. Cooperation with the United States National Museum and with the Forest Service is in effect. The work has for its objects the securing of authentic information regarding native and cultivated plants of economic importance, in order to make available an accurate botanical knowledge of those plants and records of their value and uses. Special additional investigations this year are the improvement of the grazing lands in the National Forests, the chief work being located at Wallowa, Oreg.; the domestication of the native blueberries; the study of the plants used by the aborigines; the preparation of an authoritative

Coville, Frederick V.--Continued.

manual of the flora of Alaska; and also of a catalogue of the botanical literature in the various Government libraries in Washington. Expenses this year in these lines of work, about \$9,800, of which \$8,800 is for salaries and \$1,000 for traveling and other miscellaneous expenses. The investigations of Messrs. Hitchcock, Safford, and Wight, described elsewhere in these pages, are directed by Mr. Coville.

COX, H. R. Assistant in weed and tillage studies, Farm Management Investigations. See Cates.

CRON, A. B. Assistant in laboratory investigations, Grain Standardization. See Duvel.

CROSBY, M. A. Assistant agriculturist, Farm Management Investigations. In charge of work in District No. 2, embracing Alabama, Mississippi, and Tennessee. (See Brodie.) The chief work in this district is being conducted at Huntsville, Talladega, and Uniontown, Ala.; Macon, Ridgeland, and Wiggins, Miss.; and Darks Mills and Whiteville, Tenn. Diversification farms are conducted as object lessons at these and other points throughout the district; and the work also includes a study of the methods of growing and handling various coarse legumes throughout the Southern and Northern States and a study of crops adapted for use as winter cover crops in the South. Corn, cotton, alfalfa, peas, vetches, clover, and various truck crops are under investigation. The work in this district is conducted with special reference to the boll weevil problem. Expenses this year, about \$3,000, of which \$2,000 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

DENNIS, S. J. Expert in technical fruit refrigeration and transportation problems, Field Investigations in Pomology. See Powell.

DERR, H. B. Agronomist, Grain Investigations. Engaged in barley investigations. Work is being conducted at Fargo, N. Dak.; Brookings, S. Dak.; McPherson, Kans.; Madison, Wis.; St. Paul, Minn.; College Park, Md.; and Knoxville, Tenn., in cooperation with the State experiment stations; and also in Montana, Wyoming, Nebraska, Colorado, Oklahoma, Texas, Missouri, Virginia, Iowa, Illinois, and Indiana. The objects of the work are the improvement of our present barleys in yield, quality, etc.; to establish hardy winter types; to produce pure types; and to introduce and improve the beardless and hull-less barleys. Expenses this year, about \$2,600, of which \$1,600 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

DEWEY, LISTER H. Botanist in charge of Fiber Investigations. Work is being conducted at Hanover, Pa.; Mendota and Waupun, Wis.; St. Paul, Minn.; Lincoln, Nebr.; Lexington, Ky.; Brownsville, Tex.; San Diego, Courtland, and Los Angeles, Cal.; Mayaguez and Yauco, Porto Rico; and Honolulu and Sisal, Hawaii. Cooperation with the experiment stations of Wisconsin, Minnesota, Porto Rico, and Hawaii is in effect. The objects of the work are the introduction of a new hemp-growing industry in Pennsylvania and Wisconsin; the improvement of hemp varieties, including trials of Manchurian hemp; the production of ramie fiber in California; and the introduction of sisal, henequen, and other hard fiber producing plants into Porto Rico and Hawaii. Trials of sisal, henequen, zapupe, and other

Dewey, Lyster H.--Continued.

fiber plants are also being made in Texas and California. Some attention is also being given to flax, jute, phormium, and other plant fibers. Improved methods of handling fiber crops are being worked out. Expenses this year, about \$6,500, of which \$4,500 is for salaries and \$2,000 for traveling and other miscellaneous expenses.

DILLMAN, A. C. Expert in dry land plant breeding. See Kearney.

DOANE, D. H. Special agent in studies of forage for beef, hogs, and sheep, Farm Management Investigations. See Cotton.

DODGE, L. G. Assistant agriculturist, Farm Management Investigations. In charge of work in District No. 5, embracing New York and the New England States. (See Brodie.) The work in this district covers farm practice on dairy, truck, fruit, beef, and hog farms. A study is also being made of farm practice in potato culture and of the use of potatoes as a field crop. The cropping systems on the most successful farms in the district are being closely studied. Expenses this year, about \$4,000, of which \$2,400 is for salaries and \$1,600 for traveling and other miscellaneous expenses. Mr. Dodge is assisted by Mr. M. C. Burritt.

DOYLE, C. B. Expert in cotton experiments, Bionomic Investigations. See Cock.

DRAKE, J. A. Assistant agriculturist, Farm Management Investigations. In charge of work in District No. 9, embracing Illinois, Indiana, Ohio, Kentucky, and West Virginia. (See Brodie.) The work in this district is

Drake, J. A.--Continued.

essentially similar to that in the other farm management districts. Expenses this year, about \$2,600, of which \$1,600 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

DUVAL, LAUREL. Assistant, Grain Standardization. In charge of grain standardization laboratory, Baltimore, Md. The work at this laboratory is similar to that at the Chicago laboratory, previously described (see Carroll). The laboratory was established at Baltimore for the reason that it is a semi-southern export market through which large quantities of corn are annually exported, thus affording excellent facilities for studying the effects of climatic conditions upon grain passing through this market at different seasons of the year. Expenses this year, about \$4,500, of which \$3,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses of maintenance.

DUVEL, J. W. T. Assistant in charge of laboratory methods, Grain Standardization. Engaged in laboratory investigations of the commercial grading of grain. Work includes general investigations and research bearing upon the grading, storing, shipping, and carrying quality of grains in the United States, both as regards interstate transportation and handling at points of export; ascertaining the causes of deterioration of grain in storage and transit, with a view to improving the methods of grain inspection and grading, and effecting an equitable and scientific method of grading grains. Demonstrations of the practicability of these methods are being made in the different markets and points of export in the United

Duvel, J. W. T.--Continued.

States, with the result that they are being generally adopted by most of the large grain inspection departments and grain dealers throughout the country. Expenses this year, about \$12,500, of which \$7,500 is for salaries and \$5,000 for equipment, necessary travel, and other miscellaneous expenses. Dr. Duvel is assisted by Mr. A. B. Cron.

ELLIS, L. W. Assistant, Farm Management Investigations. Engaged in studies of farm equipment, buildings, fences, etc. Work is being conducted generally throughout the United States, consisting of a study of the equipment in buildings, fences, implements, machinery, and live stock on a large number of farms, in order to secure a knowledge of the equipment necessary for maximum profit on farms of different types. A study of the space required in farm buildings per unit of animal crop product is being made, with a view to securing data that will permit the planning of farm buildings on a scientific basis. The cost and adaptability of different types of farm fences, of small tools and sundries, and of equipment used in handling manure, are also being studied. Expenses this year, about \$2,500, of which \$1,400 is for salaries and \$1,100 for traveling and other miscellaneous expenses.

EVANS, JAMES A. Special agent, Farmers' Co-operative Demonstration Work. In charge of demonstration work in Louisiana and Arkansas, with headquarters at Shreveport, La. This is a part of the cooperative demonstration work conducted under the direction of Dr. S. A. Knapp and is similar to that conducted in Oklahoma (see Bentley). Expenses this year, about \$30,000, of which \$22,000

Evans, James A.--Continued.

is for salaries and \$8,000 for traveling and other miscellaneous expenses. Mr. Evans is assisted by a corps of field agents.

EVANS, M. W. Assistant, Forage Crop Investigations, Pullman, Wash. See Piper.

FAIRCHILD, DAVID. Agricultural explorer in charge of Foreign Seed and Plant Introduction. Work is conducted through agricultural explorers sent to foreign countries in search of rare and valuable seeds and plants suitable for cultivation in various parts of the United States. Numerous introductions are being tested throughout the country in cooperation with the State experiment stations and with more than 20,000 correspondents, including Alaska, Porto Rico, Hawaii, the Philippine Islands, and the Canal Zone. In addition to this pioneer work of testing new industries on a small scale to determine their value, special cooperative investigations are being carried on with other offices of the Bureau, as follows: On Phylloxera resistant grapes and newly introduced table grapes, at Chico and other points in California (see Husmann); on date introductions and special date gardens at Mecca and Indio, Cal., and on the pistache (see Swing); on Mexican peach varieties in Texas (see Scofield); on mangos, avocados, and annas at Miami, Fla. (see Wester); and on newly introduced grains (see Carleton). Other plants under experiment with a view to their introduction are yautias, the new root crops for the wet lands of the South, especially South Carolina and Florida; bamboos for the cheap lands of Alabama and Louisiana; Japanese, Chinese, and other matting plants

Fairchild, David--Continued.

for the manufacture of floor mattings, matting lath, etc., tests of these plants being under way at Pierce, Tex.; Crowley, La.; Jacksonboro, S.C.; and in Georgia, California, and Florida; European globe artichokes and West Indian chayotes for the truck regions of the South, chiefly in South Carolina, Louisiana, and Mississippi; cork oaks for the poor lands of the Carolinas and Georgia; and European hops for the Pacific Coast and New York hop areas. All of this work is closely related to and forms a large part of that of the Plant Introduction Garden at Chico, Cal. (see W. W. Tracy, Jr.). A plant introduction garden is also maintained at Ames, Iowa, in cooperation with the Iowa Experiment Station. Expenses this year in these phases of the work, about \$20,000, of which \$12,000 is for salaries and \$8,000 for traveling and other miscellaneous expenses, including the purchase and importation of rare seeds and plants. Mr. Fairchild is assisted by Messrs. Walter Fischer, R. A. Young, Fred W. Clarke, and Frederic F. Chiselm. The investigations of Messrs. Hills, Mann, and Meyer, described elsewhere in these pages, are directed by Mr. Fairchild; and the Siberian explorations of Prof. N. E. Hansen, described later, are also a part of the work.

FARRELL, F. D. Assistant in dry-land cereal experiments, Grain Investigations, Nephi, Utah. See Jardine.

FAWCETT, EDNA H. Assistant in soil bacteriology. See Kellerman.

FISCHER, WALTER. Assistant, Foreign Seed and Plant Introduction. See Fairchild.

FITZ, L. A. Assistant, Grain Standardization. In charge of cooperative wheat milling and baking tests at the North Dakota Agricultural Experiment Station, Agricultural College, N. Dak. This work consists of investigations to determine the relative flour and bread values of the different classes and varieties of wheat grown in the United States in so far as relates to their commercial grades. The object is to obtain information which will greatly aid in fixing just, uniform, and intelligent grades for wheats. Expenses this year, about \$2,600, of which \$1,800 is for salaries and \$800 for miscellaneous expenses. Mr. Fitz is assisted by Mr. Clyde H. Bailey.

FLETCHER, W. F. Assistant in fruit district investigations. See Gould.

FOUBERT, C. L. Chemist aid in laboratory investigations on tobacco. See Garner.

FREAR, DANA W. Special agent in malting barley investigations. See Mann.

FROLEY, J. W. Assistant, Farm Management Investigations. Engaged in the study of farm practice in poultry management, in addition to executive duties in the Office of Farm Management Investigations. Work on poultry is being conducted generally throughout the United States, the object being to obtain knowledge of the best methods of managing poultry. Farms on which poultry is made to form an important part of the farm income are visited and the methods observed in rearing, feeding, and the general management of poultry and in the marketing of poultry and poultry products. The chief aim is to secure sufficient knowledge of the best poultry

Froley, J. W.--Continued.

practices to include poultry in the general farm plans prepared by the Office of Farm Management Investigations. Expenses this year, about \$3,000, of which \$2,400 is for salaries and \$600 for traveling and other miscellaneous expenses,

GARNER, W. W. Assistant, Tobacco Investigations. Engaged in chemico-physiological tobacco investigations. Work is being conducted in the laboratory at Washington, D.C., and also at Suffield and Tariffville, Conn.; Hinscn and Tallahassee, Fla.; Palestine, Tex.; and Germantown, Ohio, at the latter point in cooperation with the Ohio Experiment Station. In the laboratory the work pertains to the relation of the composition of tobacco to its important qualities, such as elasticity, burn, and nicotine content. The field work includes experiments in improved methods of curing tobacco; the breeding of varieties for high and low nicotine content; tests of the effects of shade on the composition and properties of tobacco; and tests of the influence of fertilizers on the quality of tobacco. Improved methods of testing the burn and determining the nicotine content of tobacco have been developed and put to practical use. Expenses this year, about \$5,000, of which \$3,500 is for salaries and \$1,500 for traveling and other miscellaneous expenses. Dr. Garner is assisted by Mr. C. L. Foubert.

GILBERT, W. W. Assistant in cotton and truck crop disease investigations. See Orton.

GOLL, F. L. Assistant in legume bacteria experiments. See Kellerman.

GOMME, WM. H. F. Expert, South Texas Garden, Brownsville, Tex. See Green, E. C.

GOODRICH, C. L. Expert, Farm Management Investigations. In charge of work in District No. 1, embracing North Carolina, South Carolina, Georgia, and Florida. (See Brodie.) The work in this district is essentially similar to that in the other farm management districts. Special demonstration work is being conducted in South Carolina in cooperation with about 100 farmers in the use of legumes as catch and cover crops and green manures; the inoculation of legumes new to the soil; a test of the Williamson method of corn growing; breeding varieties of cotton and corn adapted to local conditions; tests of fertilizers; production of hay; etc. The work in this district is conducted with special reference to the boll weevil problem. Expenses this year, about \$5,000, of which \$3,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses.

GOSS, W. L. Assistant, Seed Laboratory. See Brown, Edgar.

GOULD, H. P. Pomologist, Field Investigations in Pomology. Engaged in fruit district investigations. Work is being conducted at Geneva, N. Y.; Gerrardstown, Paw Paw, and Keyser, W. Va.; Experiment, Ga.; Akron, Colo.; Hutchinson, Kans.; and at points in New Jersey, Maryland, Delaware, Virginia, North Carolina, Missouri, Arkansas, and Oklahoma. Cooperative phenological investigations are also being made by fruit growers in practically every State and Territory. The object of this work is to determine the adaptability of different fruit varieties to different con-



Gould, H. P.--Continued.

ditions by a systematic study of the behavior of the varieties when grown under a wide range of conditions. This work has a bearing upon the further development of the fruit growing industry, as it aims to supply the fruit grower with information which will enable him to select those varieties which will best serve his purpose. Attention thus far has been given primarily to deciduous orchard fruits, but the small fruits and other fruit crops have also received incidental consideration. Investigations are also being made of the adaptability of early apples; of methods used on farms in canning and cider making; of western orchard management; and of the adaptability of fruit varieties to dry land conditions. Expenses this year, about \$5,500, of which \$4,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses. Mr. Gould is assisted by Mr. W. F. Fletcher.

GREEN, EDWARD C. Pomologist in charge of the South Texas Garden, Brownsville, Tex. This garden is located on a part of the Fort Brown Military Reservation, and is maintained in cooperation with the Texas Experiment Station. The work includes the propagation and distribution of different varieties of foreign and domestic seeds and plants. Special attention is being given to the breeding, propagation, and distribution of varieties of grapes, citrus fruits, bananas, dates, Smyrna figs, and fiber plants; and to an investigation as to which vegetables and forage plants are most suitable for extreme southern conditions. Expenses this year, about \$9,000, of which \$6,000 is for salaries and \$3,000 for traveling and miscellaneous expenses of maintenance. Prof. Green is assisted by Mr. Wm. H. F. Gomme.



GREEN, W. W. Crop technologist, Virginia tobacco investigations. See Mathewson.

GRIFFITHS, DAVID. Assistant agriculturist, Farm Management Investigations. Engaged in range management and cactus investigations. Work on range management is being conducted chiefly on the Santa Rita National Forest, Tucson, Ariz.; but also in various portions of the Dakotas, Idaho, Montana, Washington, Oregon, Nevada, Utah, California, Colorado, New Mexico, Nebraska, and Kansas. The work in Arizona, Washington, and New Mexico is conducted in cooperation with the experiment stations. The object of the work is to ascertain the best range practices with a view to the improvement of native pastures by reseeding and to study native pasture feeds in general. Cactus investigations are being conducted at San Antonio and Brownsville, Tex.; Agricultural College, N. Mex.; Tucson, Ariz.; Chico and Riverside, Cal.; and Gainesville, Fla., in cooperation with the experiment stations and with private individuals. The work has for its objects the testing of native and introduced species of cactus plants, the study of the growth, chemical composition, and nutritive value of the plant and fruit as food for both man and beast, and the improvement of species in relation to objectionable characteristics and hardness by breeding and selection, methods of feeding, harvesting, cultivating, etc. Expenses this year in these lines of work, about \$6,500, of which \$5,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

HANSEN, N. E. Agricultural explorer, Foreign Seed and Plant Introduction. Engaged in agricultural explorations in northern Siberia, in search of hardy forage plants and fruits which will stand the severe climate of the northwestern United States. This is the third expedition to this region, where valuable new alfalfas which will live through extreme cold have already been found. One of these has already proved itself of great value for the Northwest, and others are now under trial. As the climate of Siberia is even more severe than that of the Northwest, and as the new seeds and plants already secured have proved unusually hardy, the opportunities for finding valuable seeds and plants in that region are very great. Expenses this year, about \$15,000, including salary, the purchase and importation of seeds and plants, and traveling and other miscellaneous expenses incident to the explorations.

HARRIS, GEORGE W. Crop technologist, Tobacco Investigations. Engaged in tobacco investigations in New York. Work is being conducted at Baldwinsville, in Onondaga County, having for its objects the improvement of types by breeding and the introduction of new types; the introduction of bulk fermentation of tobacco; and experiments with Russian hairy vetch as a cover crop for tobacco fields. The tobacco grown in New York is the same as that grown in the Connecticut Valley, and the improved types developed by breeding and selection in Connecticut are being introduced into New York. Improvements in cultural methods and in the use of fertilizers are also being worked out. Expenses this year, about \$2,500, of which

Harris, George W.--Continued.

\$1,800 is for salaries and \$700 for traveling and other miscellaneous expenses.

HARTER, L. L. Assistant physiologist in truck crop disease investigations. See Orton.

HARTLEY, C. P. Physiologist in charge of Corn Investigations. Breeding work and variety tests with very early, medium, or late maturing varieties are being conducted in cooperation with the experiment stations and practical farmers in Connecticut, Delaware, Florida, Idaho, Maryland, Massachusetts, Maine, Michigan, Minnesota, North Dakota, New Hampshire, New York, Nebraska, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Texas, Utah, Virginia, and Washington; also in cooperation with corn growers in Georgia, Kansas, Tennessee, and Wisconsin. Experimental work is also being conducted at the Plant Introduction Garden, Chico, Cal.; at Yuma, Ariz.; Brownsville, Tex.; and near Washington, D.C. The objects of the work are the development of greater yielding strains of corn, possessing desirable characters and suited to the climatic and soil conditions of various sections, and demonstrating to farmers the profits resulting from good cultural methods, high yielding varieties, and careful seed selection and preservation. Breeding and experimental work with sweet corn is being conducted for the purpose of producing improved strains for canning and table purposes, and to determine the effect of climate and soil upon the formation of sugar in sweet corn. The latter phase of the work is conducted in cooperation with the Bureau of Chemistry. Expenses this year, about \$13,500,

Hartley, C. P.--Continued.

of which \$8,000 is for salaries and \$5,500 for traveling and other miscellaneous expenses. Associated with Mr. Hartley in this work are Messrs. Ernest B. Brown, Curtis H. Kyle, and L. L. Zook.

HASSE, CLARA H. Assistant in laboratory investigations of fruit diseases. See Waite.

HASTINGS, S. H. Farm superintendent, San Antonio, Tex., Experiment Farm. See Scotfield.

HAWKINS, L. A. Assistant in investigations of diseases of small fruits. See Shear, C. L.

HEADLEY, F. B. Assistant, Western Agricultural Extension. See Scotfield.

HEDGCOCK, GEORGE G. Pathologist, Laboratory of Forest Pathology. Engaged in investigations of diseases of coniferous and other woods, diseases caused by mistletoe, etc. Work on forest trees and woods is being conducted chiefly on the National Forests, in close cooperation with the Forest Service; and investigations of the mistletoe diseases are being carried on throughout the Southern States, chiefly in Texas and Tennessee. The work includes the wood-rotting diseases of pines, spruces, firs, larches, and other trees in the western forests; and the damage caused by mistletoe to species of oak, elm, hackberry, cottonwood, etc. Methods of prevention are being worked out, and in the case of mistletoe possible means of extermination are being studied. Expenses this year, about \$4,400, of which \$2,200 is for salaries and \$2,200 for traveling and other miscellaneous expenses.

HEDGES, FLORENCE. Assistant, Laboratory of Plant Pathology. See Smith.E.F.

HENKEL, ALICE. Assistant and compiler, Drug Plant Investigations. See True.

HILLMAN, F. H. Assistant botanist in pure seed investigations, Seed Laboratory. See Brown, Edgar.

HILLS, WM. D. Agricultural explorer, Foreign Seed and Plant Introduction. Engaged in agricultural explorations in Japan, in search of timber bamboos for introduction into the United States. The objects of the work are to demonstrate that the timber bamboos of the Orient, which are among the most profitable plant cultures of the Orientals, can be grown with profit on the cane-brake lands of the South, and on other lands which are not now occupied by crops. Scattered groves of these plants in America have shown that they will grow in the United States, and the development of an American bamboo industry is the aim of the work. Hardy forms from China, drought-resistant forms from India, and the tropical giant bamboos from Porto Rico are also being tested, chiefly in Alabama, Louisiana, and California; and the uses to which bamboos can be put are also being studied. Expenses this year, about \$3,500, of which \$1,800 is for salaries and \$1,700 for traveling and other miscellaneous expenses incident to the explorations and experiments.

HINSON, W. M. Crop technologist, Tobacco Investigations. Engaged in tobacco investigations in Texas and Alabama. Work is being conducted at Palestine and Nacogdoches, Tex., and at Marion, Ala., consisting in experiments with cigar leaf tobacco; tests of the

Hinson, W. M.--Continued.

advisability of using fertilizers and cover crops on tobacco soils; and seed breeding to secure acclimatized strains of tobacco suitable to Texas and Alabama conditions. Advice relative to the construction of shade for wrapper tobacco and of tobacco curing barns, and to methods of fermentation is furnished to growers; and tests of cover crops such as peas and hairy vetch are being made. The improvement of types by breeding and selection is also a leading feature of the work. Expenses this year, about \$9,500, of which \$7,000 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Mr. Hinson is assisted by Messrs. Otto Olson and J. E. Blohm.

HITCHCOCK, A. S. Systematic agrostologist, Taxonomic and Range Investigations. Engaged in the preparation of a manual of the American grasses, and in collecting information concerning the economic grasses of the world, especially those species which may prove useful in the United States or its insular possessions. Work is mainly performed at Washington, D. C., supplemented by field work in the Western States. The work has for its primary object the collection of authentic information regarding American grasses, their variation, adaptability, and economic features, to be embodied in a manual of the American grasses. The grasses received by the office of Foreign Seed and Plant Introduction are identified and that office is furnished with information to guide explorers in securing valuable grasses for trial. A digest of notes and observations as to the value of the different species of grasses for forage and for other economic purposes is being made. Expenses this year, about

Hitchcock, A. S.--Continued.

\$5,500, of which \$4,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses. Mr. Hitchcock is assisted by Mrs. Agnes Chase.

HOOD, S. C. Assistant in camphor experiments, Drug Plant Investigations. See True.

HOSFORD, G. W. Assistant pomologist in fruit marketing, transportation, and storage investigations. See Powell and Taylor.

HUNTER, BYRON. Assistant agriculturist, Farm Management Investigations. In charge of work in District No. 6, embracing Oregon, Washington, Idaho, and northern California. (See Brodie.) The work in this district is essentially similar to that in the other farm management districts. Special studies are being made of wheat growing, grasses and forage plants, crop rotation, and methods of hog feeding practiced by the most successful hog raisers. Expenses this year, about \$3,000, of which \$2,000 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

HUSMANN, F. L. Viticultural superintendent, Field Investigations in Pomology. See below.

HUSMANN, GEORGE C. Pomologist, Field Investigations in Pomology. Engaged in viticultural investigations. Work is being conducted at Vineland, N.J.; Enfield and Willard, N.C.; New Smyrna, Fla.; Brownsville, Tex.; and at Oakville, Fresno, Stockton, Chico, and other points in California. Cooperation with the California and New Jersey experiment stations and with the North Carolina Department of Agriculture is in effect. Ten experimental

Husmann, George C.--Continued.

vineyards are being conducted in California, in cooperation with the office of Foreign Seed and Plant Introduction. The object of the work in California is the preservation, improvement, and development of the Vinifera grape industry of the United States. In the South Atlantic and Gulf coast States special attention is being devoted to the development of the Rotundifolia grape industry as represented by the Scuppernong and allied varieties. In New Jersey an effort is being made to reestablish the grape industry, with special reference to the manufacture of unfermented grape juice. Miscellaneous viticultural problems are being studied in various parts of the country, as are the best methods of handling, keeping, and marketing the fruit and of the manufacture, storage, care, and disposition of the products made therefrom. Expenses this year, about \$11,500, of which \$7,000 is for salaries and \$4,500 for traveling and other miscellaneous expenses. Mr. Husmann is assisted by Messrs. Alfred Tournier and F. L. Husmann.

IRWIN, WM. N. Assistant pomclogist in fruit identification and description. See Brackett.

JAMIESON, CLARA O. Assistant in laboratory studies of diseases of the sugar beet and other plants. See Townsend.

JARDINE, WM. M. Agronomist, Grain Investigations. Engaged in investigations of dry land cereals. Work is being conducted chiefly in the Great Plains Area and the dry and high intermountain districts of the West, in cooperation with the State experiment sta-

Jardine, Wm. M.--Continued.

tions. Experiments are now in progress at Williston, N. Dak.; Bellefourche, S. Dak.; Akron, Colo.; Dalhart, Tex.; Lewiston, Mont.; and Nephi, Utah. The work consists largely of the development of more hardy and drought-resistant varieties of cereals such as wheat, emmer, spelt, barley, oats, millets, sorghums, etc. Special attention is being given to the breeding of pure types from individual plants, and to the securing by this means of seed for distribution among farmers, to be grown in place of the very badly mixed varieties now in use. A special feature of the work is the securing of hardy winter types, in order to make possible the further extension of winter grain production in the semiarid districts. A study of earliness in grains, with a view to the development of varieties that will mature at high altitudes, is also being made. All of this work is closely related to the other work of the Bureau on cereals and on dry land agriculture. Expenses this year, about \$14,000, of which \$9,000 is for salaries and \$5,000 for traveling and other miscellaneous expenses. Mr. Jardine is assisted by Messrs. F. D. Farrell and Cecil Salmon.

JEFFERS, L. M. Assistant, Grain Standardization. Engaged in interstate grain transportation investigations. Work is being conducted at the principal grain centers in connection with the grain standardization laboratories, and also at points of export. The object of the work is to ascertain the changes which take place in grain during transit in railroad cars and lake steamers. The factors of condition and quality, including the moisture and temperature of the

Jeffers, L. M.--Continued.

grain, together with the relative humidity and temperature of the air at the time of loading and also at the time of discharge at destination. All of this work has an important bearing on the general problem of grain standardization. Expenses this year, about \$2,700, of which \$1,500 is for salaries and \$1,200 for traveling and other miscellaneous expenses.

JENSEN, CHARLES A. Agriculturist, Dry Land Agriculture Investigations, Bellefourche, S. Dak. See Chilcott.

JOHNSON, EDWARD C. Pathologist, Grain Investigations. Engaged in investigations of cereal diseases, especially rusts and smuts. Field work is being conducted in practically all of the grain-producing States, particularly at Fargo, N. Dak.; Brookings, S. Dak.; St. Paul and Crookston, Minn.; McPherson, Kans.; and Amarillo, Tex. Cooperation with the experiment stations of those States is in effect. Much laboratory and greenhouse investigation is necessarily connected with the work. Cultures of the different species of rusts and smuts are made, and their life histories and biologic forms studied with the object of the ultimate prevention of these diseases. It is the aim to discover the different host plants, other than grains, which harbor these parasites, so that crop arrangements can be made which will eliminate as far as possible the spread of diseases from wild host plants to cereals. In the field careful notes are taken on the resistance to disease of the different varieties of grain and an effort is being made to develop further rust-resistant varieties through hybridization and selection. The

Johnson, Edward C.--Continued.

smuts of sorghum, barley, wheat, and other grains; the bunt of wheat; and the rusts of cereal crops are being especially studied. Expenses this year, about \$3,300, of which \$2,000 is for salaries and \$1,300 for traveling and other miscellaneous expenses.

JOHNSTON, JOHN R. Assistant, Laboratory of Plant Pathology. See Smith, E. F.

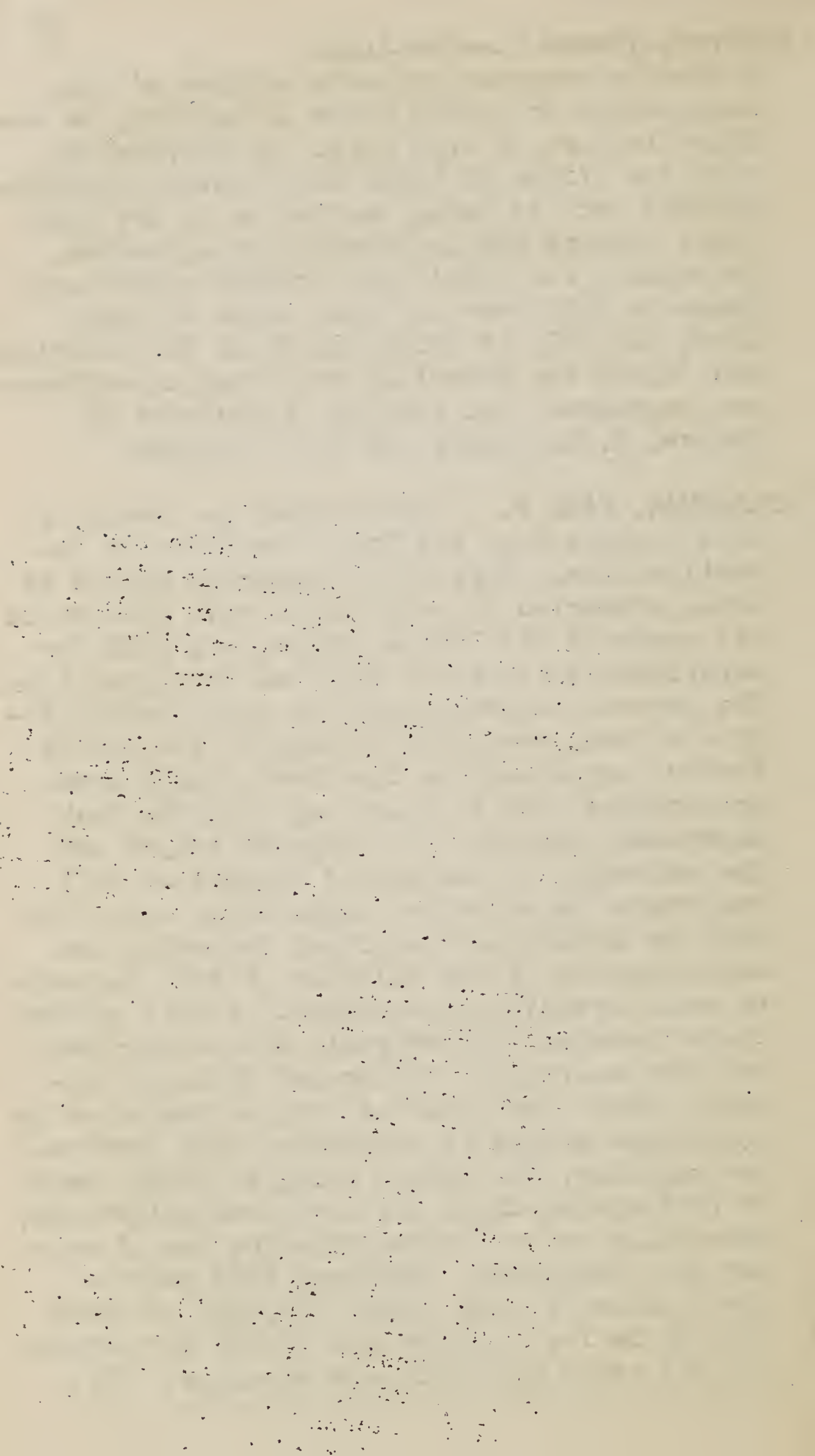
JUENEMANN, H. E. Assistant in bulb propagation, Bellingham, Wash. See Morrison.

KEARNEY, THOMAS H. Physiologist in charge of Alkali and Dry Land Plant Breeding Investigations. Work is being conducted at Bellefourche, S. Dak.; North Platte, Nebr.; Fallon, Nev.; Corinne and Garland, Utah; Yuma and Sacaton, Ariz.; and in the laboratory at Washington, D. C. Cooperation with the Nebraska Experiment Station is in effect. The work consists of the testing of varieties of different crops with respect to alkali resistance and the securing, by selecting seed from the most resistant plants, of strains that will endure greater amounts of alkali in the soil than those commonly grown. The crops receiving principal attention are various forage grasses, leguminous forage plants, sugar beets, millets, sorghum, and the date palm. Work on the breeding of drought resistant field crops is also being carried on, with the object of securing strains of forage and other field crops adapted to dry land conditions. This work is closely related to the other lines of investigation conducted by the Bureau in the semiarid West. Work on the breeding of Egyptian cottons for the arid Southwest, with

Kearney, Thomas H.--Continued.

a view to securing valuable strains of this crop suited to growth under irrigation, is another feature of this work. In cooperation with the office of Plant Life History Investigations work is being carried on in dry land olive culture and in breeding pomegranates, especially for alkali and drought resistance. Expenses this year in these lines of work, about \$12,500, of which \$8,500 is for salaries and \$4,000 for traveling and other miscellaneous expenses. Mr. Kearney is assisted by Messrs. H. L. Shantz and A. C. Dillman.

KELLERMAN, KARL F. Physiologist in charge of Soil Bacteriology and Water Purification Investigations. Work with leguminous plants is being conducted in cooperation with farmers in all parts of the United States, and with the experiment stations of Ohio and North Carolina. The general investigations in soil bacteriology are being conducted throughout the United States, especially in the Great Plains Area. Cooperative work is under way with the Utah Experiment Station. The objects sought are the extension of the use of legumes as soil renovators by effective inoculation where the soil is lacking in the proper bacteria; the determination of the relation of soil bacteria to soil fertility; the control of soil conditions favoring the desirable micro-organisms and the securing of the proper biologic balance. Water purification work is conducted as conditions demand in connection with farm water supplies, the object being to study means of controlling algal and bacterial pollutions, especially in connection with the use of copper as a treatment. Expenses this year in these lines of work, about \$19,000, of which \$14,000 is for salaries and \$5,000 for traveling and other miscellaneous expenses. Mr.



Kellerman, Karl F.--Continued.

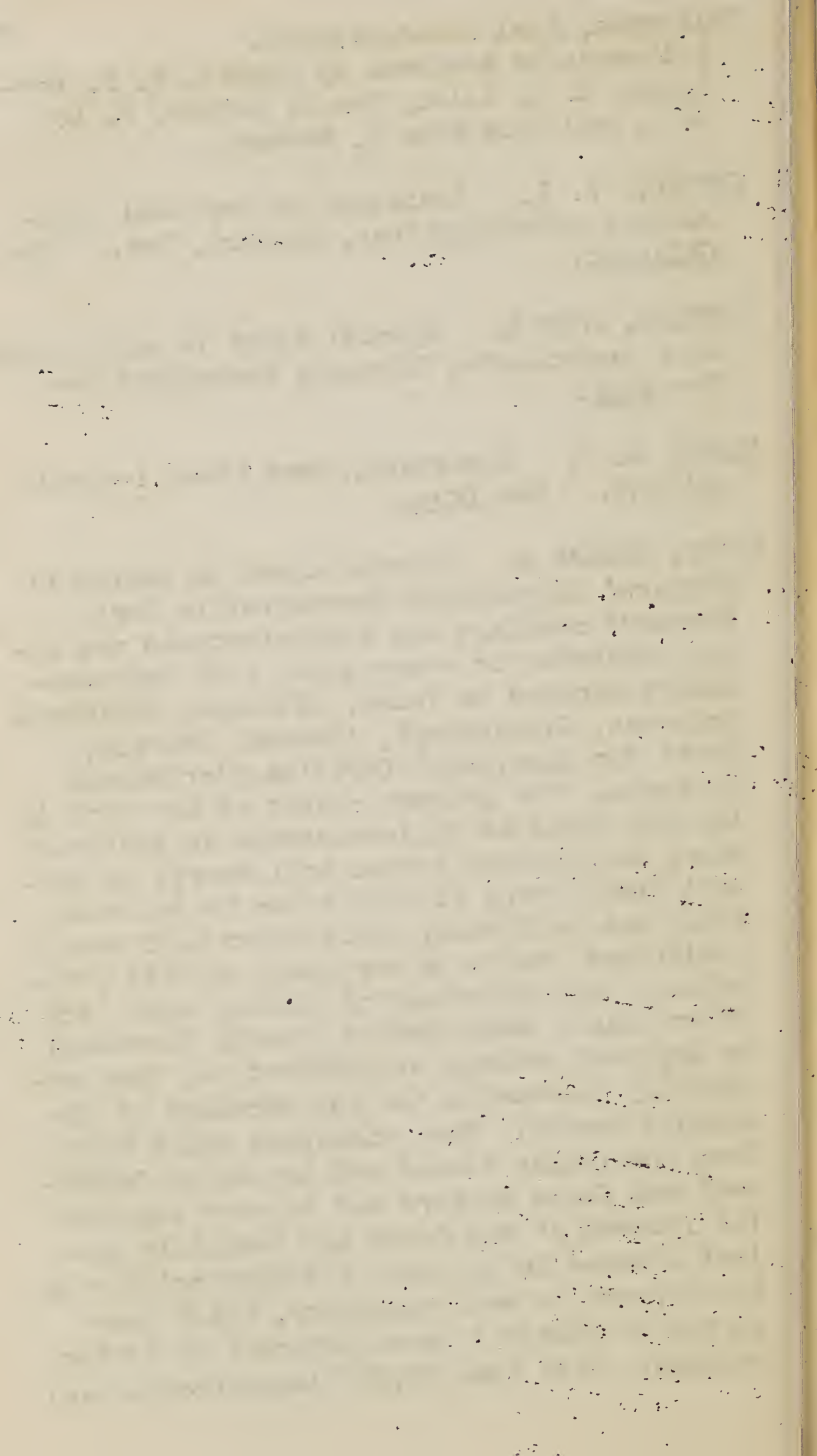
Kellerman is assisted by Messrs. T. R. Robinson, E. R. Allen, Ira G. McBeth, F. L. Goll, and Miss Edna H. Fawcett.

KENNARD, F. L. Assistant in dry land agriculture investigations, Dalhart, Tex. See Chilcott.

KINSLER, JOHN H. Special agent in cotton and corn experiments, Bionomic Investigations. See Cook.

KLUGH, G. F. Assistant, Drug Plant Investigations. See True.

KNAPP, SEAMAN A. Special agent in charge of Farmers' Cooperative Demonstration Work. Farmers' meetings and demonstrations are being conducted in cooperation with representative farmers in Texas, Oklahoma, Louisiana, Arkansas, Mississippi, Alabama, Georgia, North Carolina, South Carolina, Florida, and Virginia. The primary object of the work in the far South is to demonstrate in sections where the Mexican cotton boll weevil is present that a crop of cotton can be successfully and profitably grown under boll weevil conditions, and as a corollary to this proposition that the yield of cotton, corn, and other staple crops can be greatly increased by improved methods of cultivation, thus materially increasing the net earnings of the average farmer. The principles which have been thoroughly tested and proved by Department and State workers and by very successful farmers of the South are taught by object lessons in the way of demonstrations to the farmers in each community, which have served to awaken a great interest in better methods. More than 30,000 demonstration and



Knapp, Seaman A.--Continued.

cooperative farms have been established, and it is estimated that at least 300,000 southern farmers are reached through this channel. The expenses this year in the cotton States are stated opposite the names of Messrs. Bentley, Evans, Procter, Quicksall, and Savely, elsewhere in these pages. Dr. Knapp is assisted in the general direction of the work of these agents and their respective staffs by Messrs. S. Arthur Knapp and J. P. Campbell.

KNAPP, S. ARTHUR. Special agent, Farmers' Cooperative Demonstration Work. See above.

KYLE, CURTIS H. Assistant physiologist, Corn Investigations. See Hartley.

LEIGHTY, CLYDE E. Assistant, Grain Standardization. In charge of grain standardization laboratory, New York, N. Y. The work at this laboratory is similar to that at the Chicago laboratory, previously described (see Carroll). The laboratory was established at New York for the reason that it is the largest export market for cereal grains in the United States, besides being a North Atlantic port, at which excellent facilities are afforded for studying all classes of commercial grains in connection with the climatic conditions of the North Atlantic coast, and to collect such information concerning the handling, shipping, storing, and inspecting of grain as will aid in the establishment of definite and fair grades. Expenses this year, about \$5,500, of which \$3,500 is for salaries and \$2,000 for traveling and other miscellaneous expenses, including rent and equipment.

LEWTON, F. L. Assistant botanist in cotton experiments, Bionomic Investigations. See Cook.

McBETH, IRA G. Assistant in soil bacteriology and water purification. See Kellerman.

McCLURE, H. B. Assistant, Farm Management Investigations. Engaged in the study of farm practice relating to hay and hay making. Work is being conducted generally throughout the United States, consisting of studies of farm practices in the production, utilization, and marketing of hay, with the object of improving its quality, lessening the cost of production, and encouraging hay production in regions which now buy their hay. Experiments in the artificial curing of hay are being carried on; and the relation between weight and volume is being ascertained, as well as the practicability of buying hay in the stack instead of by the ton. Expenses this year, about \$4,500, of which \$2,200 is for salaries and \$2,300 for traveling and other miscellaneous expenses.

McCULLOCH, LUCIA. Assistant, Laboratory of Plant Pathology. See Smith.E.F.

McDOWELL, J. C. Expert, Farm Management Investigations. In charge of work in District No. 11, embracing Wisconsin, Michigan, Minnesota, North Dakota, and South Dakota. (See Brodie.) The work in this district is essentially similar to that in the other farm management districts. Expenses this year, about \$3,000, of which \$1,800 is for salaries and \$1,200 for traveling and other miscellaneous expenses.

- McKAY, A. W. Expert in fruit storage, Field Investigations in Pomology. See Powell.
- McKEE, ROLAND. Assistant, Forage Crop Investigations, Chico, Cal. See Piper.
- McLACHLAN, ARGYLE. Expert, Western Agricultural Extension. See Scofield.
- McLANE, J. W. Assistant in field investigations, Physical Laboratory. See Briggs.
- McNAIR, A. D. Expert, Farm Management Investigations. In charge of work in District No. 3, embracing Louisiana, Arkansas, and east Texas. (See Brodie.) Six diversification farms are in operation in this district, and a great interest in diversified farming has been aroused. Particular attention is being given to hay growing and cowpea seed production. The work in this district is conducted with special reference to the boll weevil problem, and in other respects the work is essentially similar to that in the other farm management districts. Expenses this year, about \$3,200, of which \$2,000 is for salaries and \$1,200 for traveling and other miscellaneous expenses.
- MANN, ALBERT. Expert, Foreign Seed and Plant Introduction. Engaged in the introduction of pure races of malting and other special barleys. Work is being conducted in the barley growing States and in other States in which it is believed these special barleys can be grown to advantage. Cooperation is maintained with the Minnesota Experiment Station, at St. Paul. The objects of the work are to determine the factors to be considered by the barley grower in the produc-

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Mann, Albert--Continued.

tion of these special barleys used largely for the production of malt and for other purposes; also to test and create pure races of the so-called pedigreed barleys of both European and American origin and to find out which kinds of soil and climate best meet the requirements of these different varieties. Both laboratory and field investigations are connected with the work. Expenses this year, about \$5,000, of which \$3,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses, including the purchase and importation of new seed. Dr. Mann is assisted by Mr. Dana W. Frear.

MARSH, C. DWIGHT. Expert, Poisonous Plant Investigations. Engaged in field investigations and experiments with poisonous plants. Work is being conducted at Hugo, Colo., and at other points throughout the stock grazing areas of the West, particularly on the National Forests. Chief attention is being given to the cause and prevention of the "loco" disease of animals. The connection of the disease with the loco plants has been proved, and it has been shown that the poisonous substance is Barium. Courses of treatment for the cure of locoed animals have been worked out as a result of laboratory and field investigation. Feeding experiments with horses, cattle, and sheep are being carried on, in order to obtain further knowledge of loco poisoning and if possible to find a remedy applicable to range conditions. Work on the effect of lupine feeding is under way; and investigations to determine definitely the number of plants which may be considered as loco plants, as well as their distribution and their relation to pe-

Marsh, C. Dwight--Continued.

culiar soil conditions, are being carried on. Involved in this is the still unsettled question whether the recognized locc plants are poisonous under all conditions. Work is also being prosecuted on the larkspurs and other poisonous plants in the western mountain districts. In all of this work material aid is furnished by the agents of the Forest Service through a cooperative agreement. Laboratory studies of the poisonous principles of the plants under investigation are being made. Expenses this year in poisonous plant investigations, about \$9,000, of which \$5,000 is for salaries and \$4,000 for traveling and other miscellaneous expenses.

MASON, SILAS C. Arboriculturist, Plant Life History Investigations. Engaged in investigations of dry land arboriculture, with special reference to the growing of deep-rooted or drought-resistant tree crops adapted for culture in dry regions where no irrigation is practiced. Work is being conducted in the Southwest, chiefly at Mecca and Indio, Cal.; Sacaton, Ariz.; and at points in Texas, Utah, and Nevada. The objects of the work are the finding of deep-rooted and drought-resistant tree crops better adapted for culture in dry land regions than the shallow-rooted annual crops now grown. Nuts, fruits, and olives are the chief plants under investigation. Promising wild plants are being tested, including a wild almond from the Pacific coast, a wild peach from Texas, and various desert plants. Drought-resistant olives are also being studied, with a view to their introduction into the dry regions of the Southwest. Expenses this year, about \$4,500, of which \$3,300 is for salaries and \$1,200 for traveling and other miscellaneous expenses.

MATHEWSON, E. H. Crop technologist, Tobacco Investigations. Engaged in tobacco investigations in Maryland, Virginia, and North Carolina, in addition to associate supervision of all Tobacco Investigations, with special reference to the work on export and manufacturing types of tobacco. The work in the three States mentioned above is being conducted at Upper Marlboro, Md.; Appomattox, Chatham, Rustburg, Bowling Green, and Louisa, Va.; and in Pitt County N.C. Cooperation with the Maryland and Virginia experiment stations is in effect. The work consists of the improvement of types by breeding and selection; tests of fertilizers and improved cultural methods for tobacco; and crop rotation demonstrations with tobacco, wheat, corn, grasses, cowpeas, and crimson clover. Tobacco is the central feature and stands as the leading and most important money crop in the rotation experiments. The object of the work is to demonstrate the benefits and increased profits resulting from an improved, systematic, and intensively conducted crop rotation. Improved methods of saving and separating tobacco seed are also being introduced, and tobacco growers are being encouraged to take up the systematic breeding of tobacco. Expenses this year in these phases of the work, about \$9,500, of which \$6,500 is for salaries and \$3,000 for traveling and other miscellaneous expenses. Associated with Mr. Mathewson in this work is Mr. W. W. Green, and they are assisted by Messrs. D. E. Brown and R. P. Cocke.

MEADE, R. M. Assistant in cotton and corn experiments, Bionomic Investigations. See Cook

METCALF, HAVEN. Pathologist in charge of Laboratory of Forest Pathology. Work is being conducted at Westbury, Cold Spring Harbor, Lake Clear Junction, Lyons Falls, and New York City, N.Y.; Ducktown, Tenn.; New Orleans, La.; Biltmore, N.C.; and at other points throughout the country, especially in the National Forests in the western United States. The work is conducted in close cooperation with the Forest Service, and also with the State experiment stations, lumber companies, railroads and telephone companies, nurseries, etc. Among the subjects under investigation are the bark disease of the chestnut, the decay of mining timbers, the effect of sulphur and other gases on trees, the leaf-dropping disease of white pine, the various diseases of ornamental and shade trees and shrubs, and a general study of the occurrence and prevalence of tree diseases. Studies are also being made of the histology and cytology of wood-rot and of various diseases of coniferous and deciduous trees, forest tree nursery stock, etc. The objects of this work are to find methods for controlling and preventing the various diseases affecting trees and woods. In addition to the work on forest diseases, investigations of rice blast and of other diseases of rice are being carried on, with a view to their prevention and the development of disease-resistant varieties. Expenses this year in these lines of work, about \$7,500, of which \$4,500 is for salaries and \$3,000 for traveling and other miscellaneous expenses. The work of Drs. Hedgcock and Spaulding, described elsewhere in these pages, is conducted in association with Dr. Metcalf.

MEYER, FRANK N. Agricultural explorer, Foreign Seed and Plant Introduction. Engaged in agricultural explorations in China, for the purpose of securing new and useful plants adapted to the climatic conditions of our arid West and Plains region, where the climate is approximately similar to that of China. Among the plants already secured as a result of these explorations are a seedless Chinese persimmon, known as the Pekin, which has been tried and found superior in flavor to any of the Japanese persimmons, as well as hardier; and valuable varieties of the Chinese date, or jujube, among them a seedless form. These, it is believed, will be valuable additions to the fruits of our arid southwestern region. The north Chinese peaches, of unusual promise; large collections of Chinese pears, grapes, plums, apples, cherries, and other fruits; and very valuable collections of ornamentals have also been secured and are being propagated. Expenses this year, about \$5,000, of which \$1,600 is for salaries and \$3,400 for traveling expenses, the purchase and importation of plants, and other miscellaneous expenses incident to the explorations.

MILES, GEORGE F. Assistant in investigations of diseases of small fruits. See Shear, C. L.

MILLER, H. A. Assistant agriculturist, Farm Management Investigations. In charge of work in District No. 8, embracing Virginia, Maryland, and Delaware. (See Brodie.) The work in this district is essentially similar to that in the other farm management districts. The chief crops being studied are peanuts, tobacco, and cereals. Special attention is being given to the study of farm

Miller, H. A.--Continued.

practice in cereal culture and to the collection of phenological data in all parts of the country regarding crop production--the dates of planting and harvesting and the dates when the crops planted at a given time are ready for use for different purposes.

Expenses this year, about \$2,600, of which \$1,600 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

MITCHELL, GEORGE F. Assistant in South Carolina tea investigations. See Truo.

MORRIS, E. L. Assistant, Grain Standardization. In charge of grain standardization laboratory, St. Louis, Mo. The work at this laboratory is similar to that at the Chicago laboratory, previously described (see Carroll). The laboratory was established at St. Louis for the reason that it is one of the principal distributing and milling points for the hard and soft winter wheats grown in the middle Northwest section. There is also much grain, including corn, shipped from this point to the gulf ports for export. Expenses this year, about \$4,800, of which \$3,300 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

MORRISON, LISLE. Assistant in general charge of Seed Distribution. Work includes the securing and distribution on Congressional and other order of quantities of vegetable, 27
flower, lawn grass, and cotton seed, as well as bulbs, grapevines, and strawberry plants; and the propagation and distribution of select varieties of improved cotton seed, tobacco seed, citrus, trees, etc. The distribution of seeds to schools throughout the country for school-garden purposes is also a

Morrison, Lisle--Continued.

feature of the work. A bulb propagating garden is maintained at Bellingham, Wash., where a study of the methods of propagating hyacinths, tulips, and narcissuses is being made, with a view to the development of a home bulb industry to supply the American markets and to avoid the present necessity of importing these bulbs from Holland. Expenses this year in these phases of the seed distribution, about \$180,000, of which \$35,000 is for salaries and \$145,000 for the expenses connected with the purchase, packing, and distribution of seeds and plants. Associated with Mr. Morrison in this work is Mr. J. E. W. Tracy, with Mr. C. A. Neal as assistant in seed cleaning and Mr. H. E. Juenemann as assistant in bulb propagation.

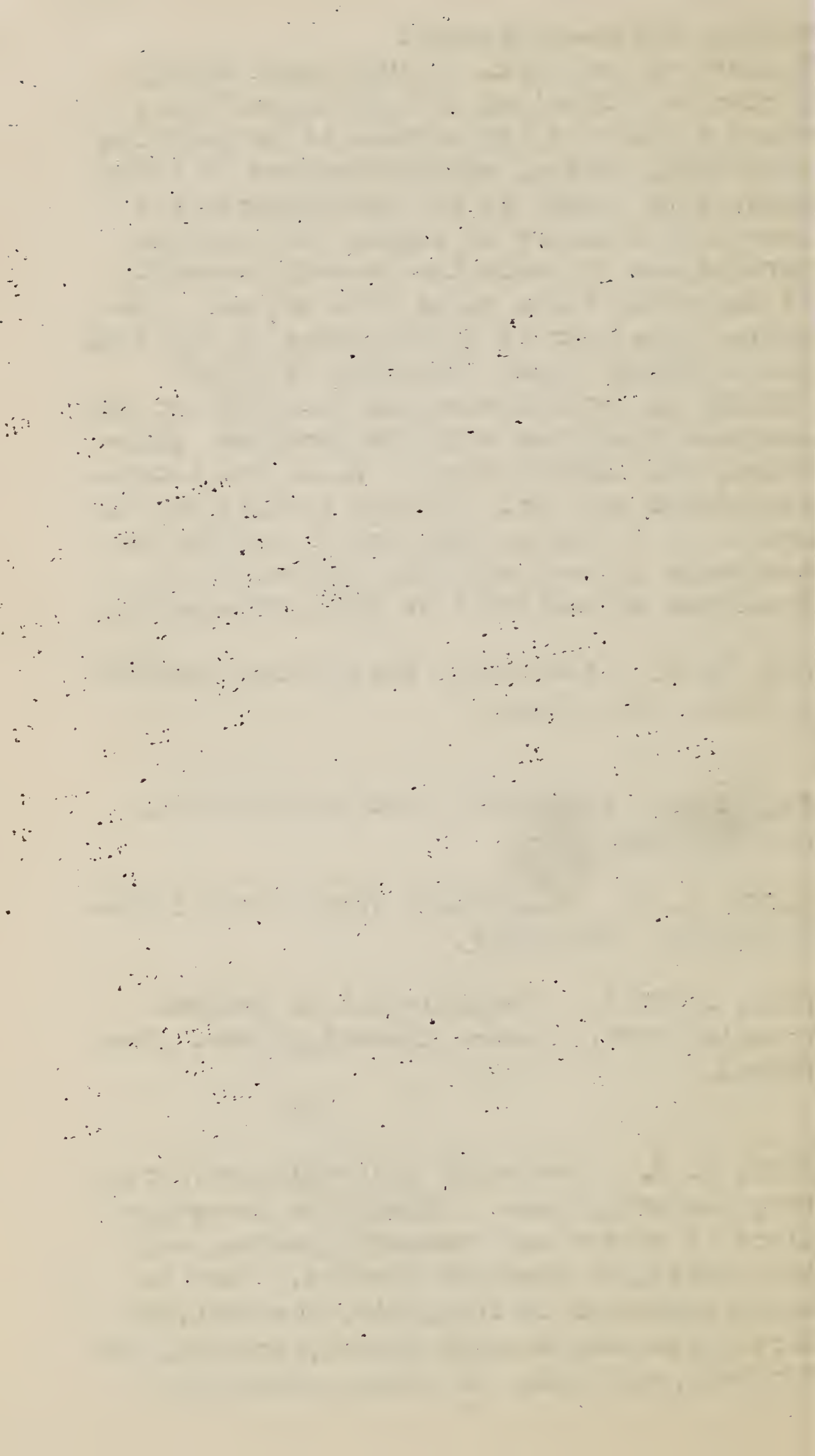
MORSE, W. J. Assistant, Forage Crop Investigations. See Piper.

NEAL, C. A. Assistant, Seed Distribution. See Morrison.

NIELSEN, H. T. Assistant, Forage Crop Investigations. See Piper.

NORTON, JESSE B. Physiologist in general breeding work, Tobacco Investigations. See Shamel.

OAKLEY, R. A. Assistant agrostologist, Forage Crop Investigations. Engaged in investigations of native and standard grasses, and the testing of improved strains. Work is being conducted in Iowa, Ohio, Wisconsin, New York, North Dakota, South Dakota, Virginia, West Virginia, and Texas, in close cooperation



Oakley, R. A.---Continued.

with the State experiment stations; and also in Colorado, Nevada, Montana, Wyoming, Kansas, Missouri, and Idaho. The objects of the work in general are the wider utilization of the standard grasses, and the introduction and extension of the culture of new and improved varieties. Experiments with meadow and pasture mixtures are being conducted. Success has been obtained in the extension of meadow fescue and brome grass, and an attempt to establish the native western wheat grass as a cultivated crop is being made. Considerable attention is being paid to the breeding and selection of improved strains of cultivated grasses, especially timothy, redtop, orchard grass, and brome grass. A number of valuable strains have been established, especially of timothy, and these are being thoroughly tested. Expenses this year, about \$6,500, of which \$4,000 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Mr. Oakley is assisted by Mr. H. N. Vinall.

O'GARA, P. J. Assistant in fruit disease investigations. See Waite.

CLIVER, GEORGE W. Expert, Experimental Gardens and Grounds. Engaged in experiments in the hybridization and propagation of plants. Work is being conducted chiefly in the Department greenhouses at Washington, but incidental field work is carried on at Santa Ana, Longbeach, Riverside, Loomis, and Ukiah, Cal.; Brownsville and Raymondsville, Tex.; and Bellingham, Wash. The work consists of the growing of Bermuda lilies from seed in the United States, with a view to eliminating the loss now incurred by florists in

Oliver, George W. - Continued.

importing diseased bulbs; the hybridization of clover and alfalfa, to obtain new types which will be resistant to cold and disease; the development of new forms of grasses and cowpeas; the improvement of lettuce by crossing, in cooperation with the Florida experiment station, the object being to secure varieties superior to those now in cultivation; the growing of tomatoes under glass, with a view to securing types better adapted to forcing than those now grown; the improvement of celery by hybridization, to eliminate pithiness and other undesirable characters; the hybridization of asparagus, to obtain forms that will resist rust; the improvement of methods of propagating tropical fruits, such as the mango and mangosteen; the hybridization of various flowering plants, such as chrysanthemums, dahlias, and roses. Expenses this year, about \$4,000, of which \$3,000 is for salaries and \$1,000 for traveling and other miscellaneous expenses.

OLSON, OTTO. Expert in Texas tobacco investigations. See Hinson.

ORTON, W. A. Pathologist in charge of Investigations of Diseases of Cotton, Truck Crops, Etc. Work is being conducted at Burlington, Vt., and in the South, chiefly at Norfolk and Portsmouth, Va.; Auburn, N.C.; Hartsville, Lamar, and Monetta, S.C.; Cairo and Edison, Ga.; Glen St. Mary and Gainesville, Fla.; and Notasulga and Columbia, Ala. Cooperation with the experiment stations of Vermont, North Carolina, and Florida is in effect. The objects of the work are to study cotton diseases and to breed wilt resistant varieties; to breed wilt resistant cowpeas and water-melons; to study pecan diseases and to find

Orton, W. A.--Continued.

means of their control or prevention; to work out methods for the control of diseases of the bean, cucumber, cabbage, potato, pea, carrot, and other truck crops, and to investigate the comparative resistance of varieties to disease; to study the nutrition diseases of truck crops, as well as the general prevalence of plant diseases in the United States. For the latter purpose a comprehensive plant disease survey is conducted in cooperation with the State experiment stations. Expenses this year, about \$10,500, of which \$8,000 is for salaries and \$2,500 for traveling and other miscellaneous expenses. Mr. Orton is assisted by Messrs. W. W. Gilbert, L. L. Harter, and Miss Adeline Ames.

PATTERSON, FLORA W. Mycologist in charge of Pathological Collections. Work is conducted entirely at Washington, D.C., and includes the identification of diseased plant material received from correspondents; critical identifications for the pathological workers of the Bureau and for the collaborators assisting in the plant disease survey; and the maintenance of mycological and host indexes of both American and foreign species. A mycological exchange is maintained for the benefit of experiment station workers and collaborators, for the purpose of extending the geographical knowledge of species, and procuring new species, both native and foreign. The work also includes the inspection of all plants imported by the office of Foreign Seed and Plant Introduction, as well as those prepared for deportation. Microscopic examinations for the presence of parasitic fungi are made, to guard against the introduction of new diseases with the imported

Patterson, Flora W.--Continued.

material. The inspection work also includes frequent examinations of the Department greenhouses, with reports upon their condition and recommendations for the treatment of diseased plants. In all of this work special attention is being given to the diseases of citrus fruits and ornamental plants. Expenses this year, about \$5,400, of which \$5,000 is for salaries and \$400 for miscellaneous expenses. Mrs. Patterson is assisted by Miss Vera K. Charles.

PAYNE, J. E. Assistant in dry land agriculture investigations, Akron, Colo. See Chilcott.

PEARCE, JULIA R. Assistant, Physical Laboratory. See Briggs.

PECK, W. A. Assistant agriculturist, Farm Management Investigations. Engaged in the study of farm economics--organization, accounts, records, labor, etc. Work is being conducted generally throughout the United States, in close cooperation with the other farm management work conducted by the Bureau in all parts of the country. In Indiana and Ohio a special study of feeding systems and the cost of producing live-stock products is being made. In all of this work a careful study is made of the various factors of production and their interrelation, including capital, equipment, labor, and the arrangement of cropping systems with a view to securing the greatest economy of equipment and labor. A study of the cost of all classes of farm operations is being made; and methods of farm bookkeeping are being worked out, including the keeping of accounts and the various classes of farm records. The records

Peck, W. A.--Continued.

obtained in the conduct of object-lesson farms (see Brodie) are kept and used in connection with this work. Expenses this year in these phases of the work, about \$7,500, of which \$4,500 is for salaries and \$3,000 for traveling and other miscellaneous expenses. The work of Mr. L. W. Ellis on farm equipment, previously described in these pages, is conducted in association with Mr. Peck.

PETERSON, W. A. Farm superintendent, Western Agricultural Extension, Yuma, Ariz. See Scofield.

PIPER, C. V. Agrostologist in charge of Forage Crop Investigations. Work is being conducted in many States in cooperation with individuals, and cooperation with the experiment stations of Virginia, Minnesota, Texas, and Washington is in effect. Extensive testing and breeding work is being conducted on the Arlington Experimental Farm, Va., especially with cowpeas, soy beans, and other annual legumes; at Chillicothe, Tex., especially with sorghums; at Pullman, Wash., with vetches and Canada peas; and at Chico, Cal., with winter legumes. The work has for its objects the improvement of the methods of handling forage crops, the extension of standard crops into sections where they are not well known, the introduction of new and improved varieties throughout the United States, and the testing of crops adapted to special conditions. The work covers all forage crops and those used especially for soil improvement. Expenses this year in these phases of the work, about \$21,500, of which \$12,500 is for salaries and \$9,000 for traveling and other miscellaneous expenses.

Piper, C. V.--Continued.

Prof. Piper is assisted by Messrs. A. B. Conner, H. T. Nielsen, Roland McKee, W. J. Morse, and M. W. Evans; and he also directs the investigations of Messrs. Oakley and Westgate, described elsewhere in these pages.

PITTIER, H. Special agent, Bionomic Investigations of Tropical Plants. See Cook.

POMEROY, C. S. Expert in fruit storage investigations. See Powell.

POWELL, G. HAROLD. Pomologist in charge of fruit transportation and storage investigations, in addition to associate supervision of Field Investigations in Pomology. Work on the transportation of citrus and deciduous fruits is being conducted at Riverside, Pasadena, Los Angeles, and other points in California; Fort Valley, Ga.; and Orlando, Arcadia, Wildwood, and other points in Florida. Work on fruit storage, chiefly the storage of apples, is being carried on at Pasadena, Redlands, Watsonville, and other points in California; Grand Junction, Colo.; Mason City and other points in Iowa; and Buffalo, Syracuse, Ghent, and other points in New York. Cooperation with the experiment stations of Iowa and New York is in effect. The objects of the work are to determine the factors that govern the successful shipping and keeping of perishable fruits; to bring about improvements in the methods of handling and shipping fruits, with special reference to their precooling for transportation and the methods followed in packing houses; and to determine practical methods of farm fruit storage. In Georgia the work has to do chiefly with the precooling of peaches; and in Florida with oranges. The work is closely

Powell, G. Harold--Continued.

related to the fruit marketing investigations conducted by Mr. Wm. A. Taylor, described later. Expenses this year, about \$36,000, of which \$18,000 is for salaries and \$18,000 for traveling and other miscellaneous expenses. Mr. Powell is assisted by Messrs. A. V. Stubenrauch, L. S. Tenny, S. J. Dennis, G. W. Hosford, C. S. Pomeroy, H. M. White, and A. W. McKay.

PROCTER, Wm. F., and J. L. QUICKSALL. Special agents, Farmers' Cooperative Demonstration Work. In charge of demonstration work in Texas, Mr. Procter in east Texas, with headquarters at Tyler, and Mr. Quicksall in west Texas, with headquarters at Waco. This is a part of the cooperative demonstration work conducted under the direction of Dr. S. A. Knapp and is similar to that conducted in eastern Oklahoma, previously described (see Bentley). Expenses this year, about \$36,000, of which \$27,000 is for salaries and \$9,000 for traveling and other miscellaneous expenses. Assisting in the work is a corps of field agents.

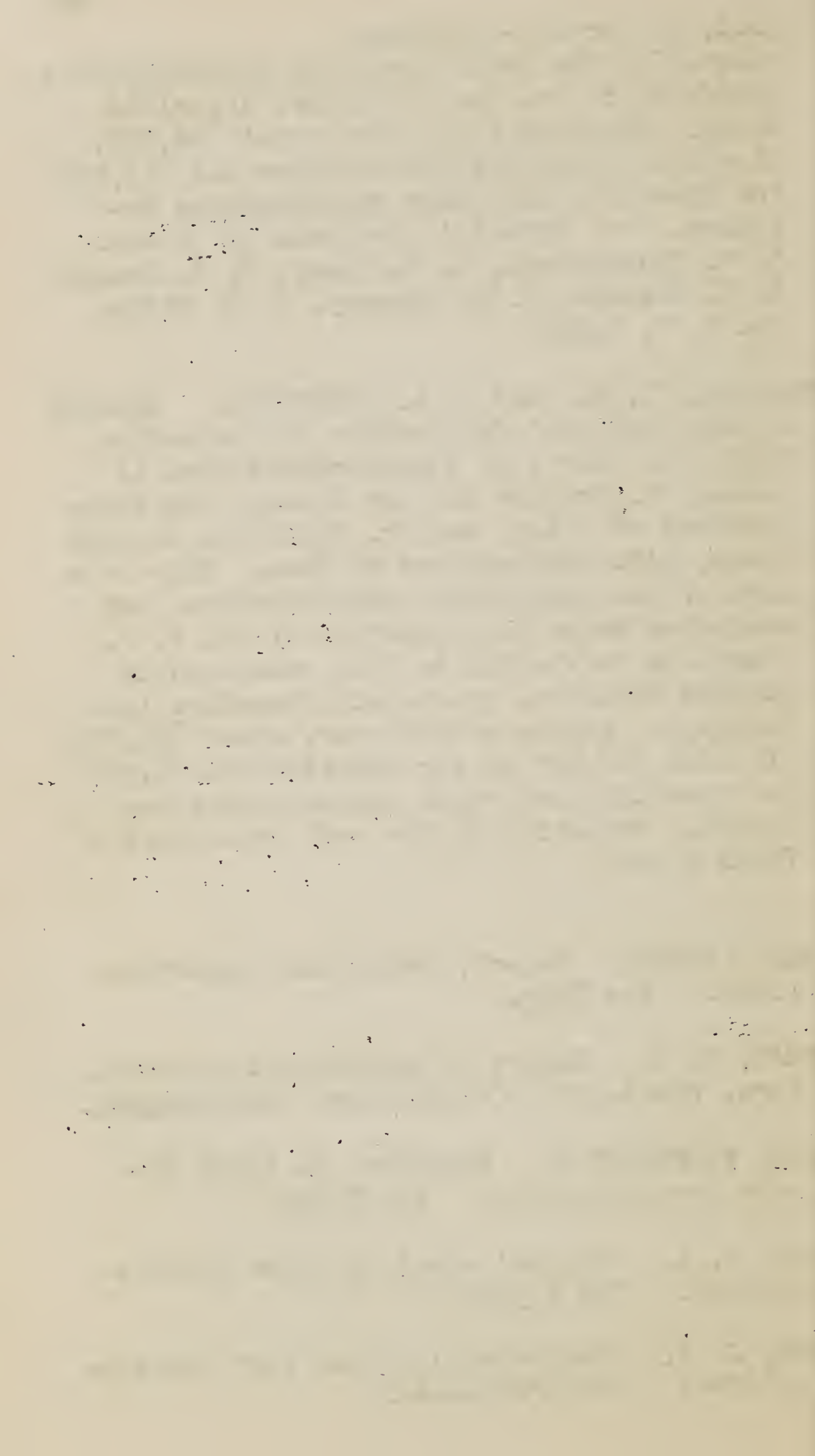
RABAK, FRANK. Expert, Drug Plant Investigations. See True.

RAGAN, W. H. Expert in pomological nomenclature, Pomological Collections. See Brackett.

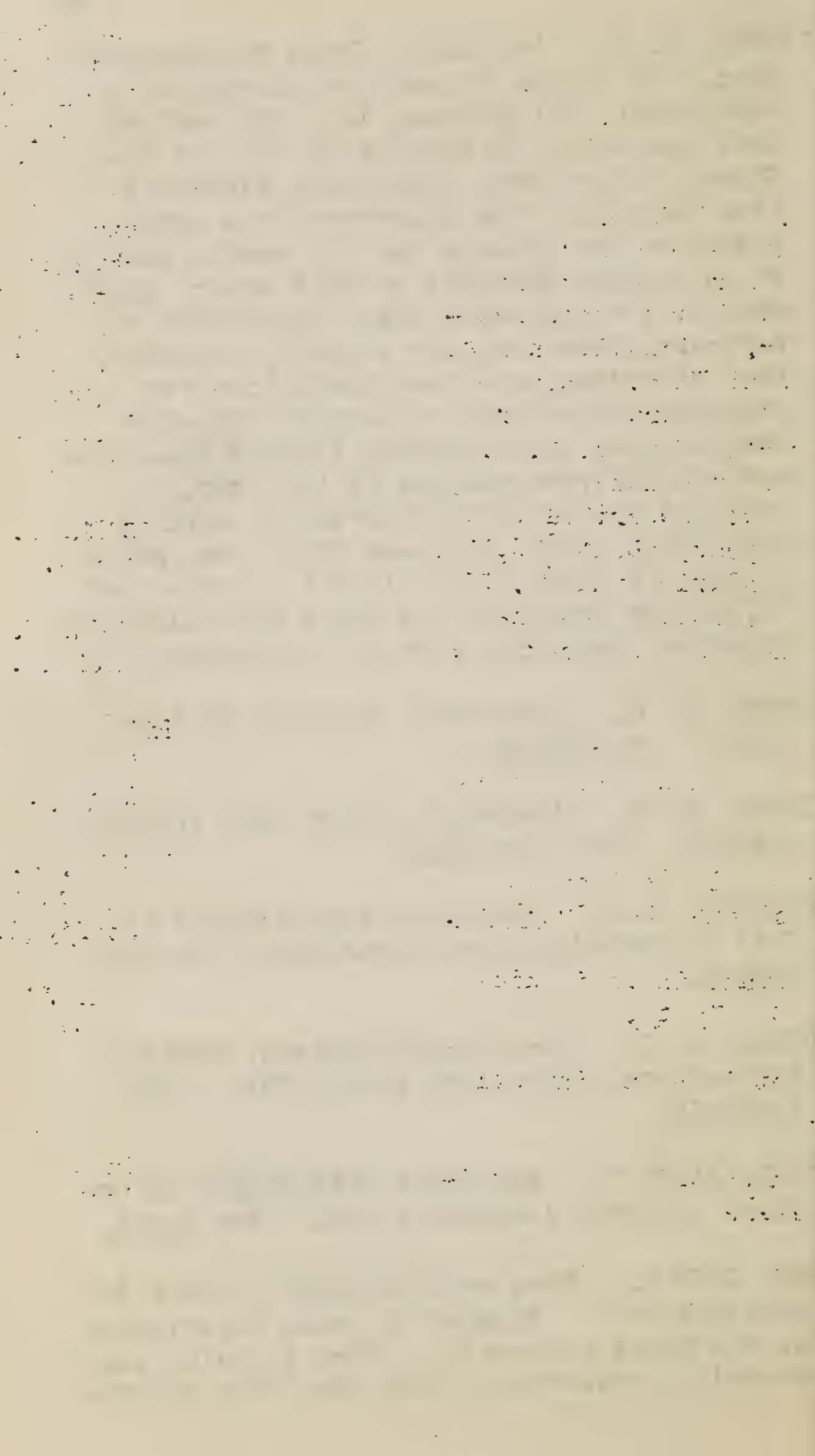
RAND, FREDERICK V. Assistant in fruit disease investigations. See Waite.

REED, C. A. Special agent in pecan investigations. See Taylor.

REED, J. F. Assistant in sugar beet investigations. See Tracy, J. E. W.



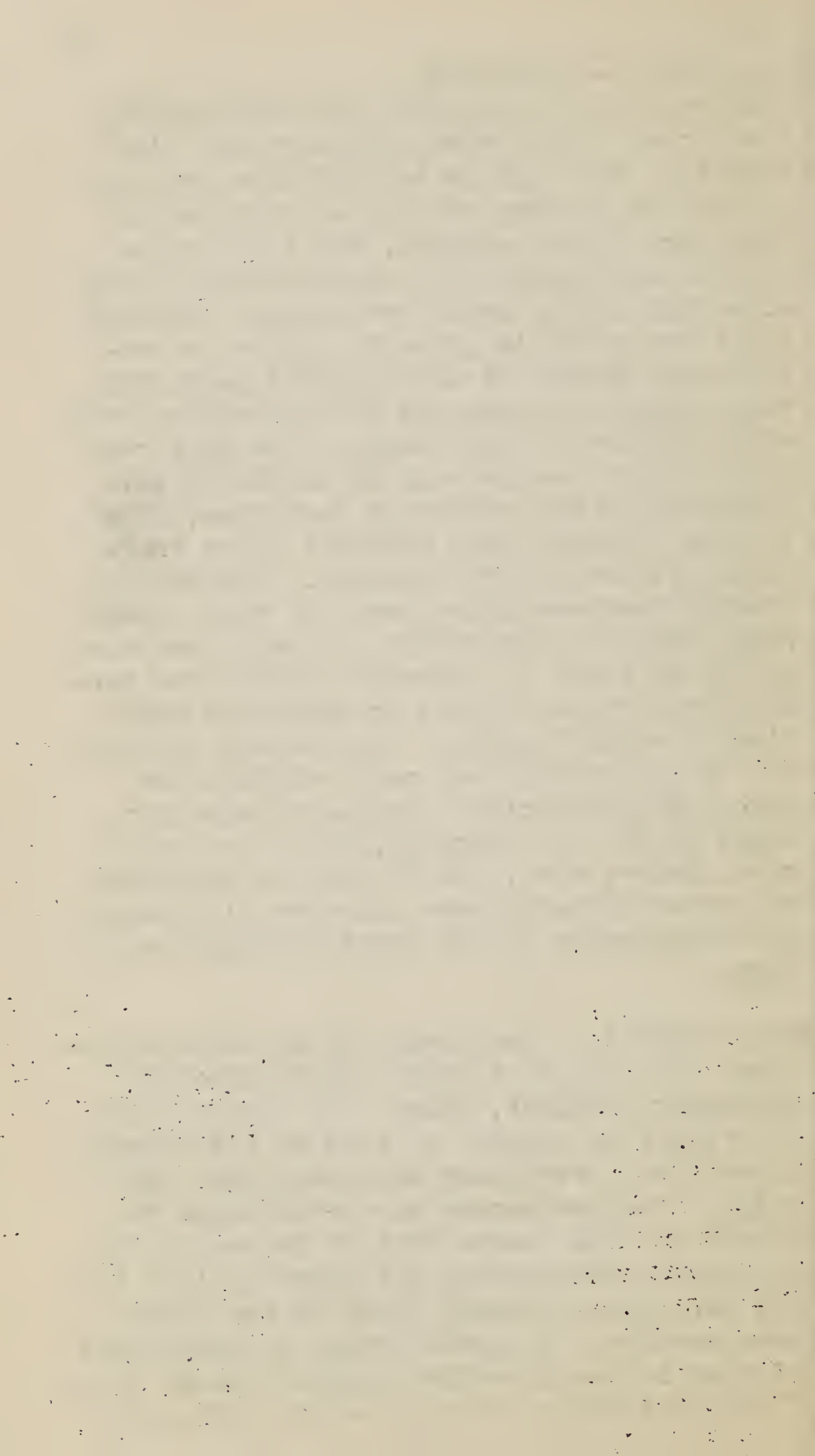
- RICHEY, E. C. Assistant, Grain Standardization. In charge of grain standardization laboratory, New Orleans, La. The work at this laboratory is similar to that at the Chicago laboratory, previously described (see Carroll). The laboratory was established at New Orleans for the reason that it is an extreme southern or Gulf export grain market, through which large quantities of northern grown corn are annually exported, thus affording excellent facilities for studying the effects of extreme climatic changes upon grain passing through this market at different seasons of the year. A study of the artificial drying of corn is also being made. Expenses this year, about \$4,300, of which \$3,000 is for salaries and \$1,300 for traveling and other miscellaneous expenses, including rent and equipment.
- RICKER, P. L. Assistant, Economic Collections. See Wight.
- RITTUE, E. C. Assistant, Sugar Beet Investigations. See Townsend.
- ROBINSON, T. R. Assistant physiologist in Soil Bacteriology Investigations. See Kellerman.
- ROGERS, S. J. Farm Superintendent, Western Agricultural Extension, Fallon, Nev. See Scotfield.
- ROPER, JAMES B. Assistant pathologist in orchard spraying demonstrations. See Scott.
- ROSS, JOHN F. Farm superintendent, Grain Investigations. Engaged in grain experiments in the Texas Panhandle. Work is being conducted in cooperation with the State experi-



Ross, John F.--Continued.

ment station, at Amarillo and Chillicothe, the former point being headquarters. The object of the work is to determine what can be done in the way of crop cultivation in that part of the country, but the results will be applicable to a considerably larger area than merely northwest Texas. Although chief attention is given to grains, a considerable amount of experimental work with other crops is conducted in cooperation with other offices of the Bureau. The work consists almost exclusively in trials of different crops and different varieties, with the aim of developing distinct types thoroughly fitted to the locality. The whole country has heretofore been one vast cattle range with no cultivation of crops whatever, and it is hoped to introduce grains and forage crops which will be an important addition to stock feeding. Experiments in methods of cultivation and crop rotation are also being conducted. Expenses this year, about \$4,500, of which \$2,500 is for salaries, labor, etc., and \$2,000 for traveling and other miscellaneous expenses, including the maintenance of the Amarillo Experiment Farm.

RYDER, FRANK J. Assistant, Grain Standardization. In charge of grain standardization laboratory, Duluth, Minn. The work at this laboratory is similar to that at the Chicago laboratory, previously described (see Carroll). The laboratory was established at Duluth for the reason that it is one of the principal distributing and export points for the hard spring wheats grown in the Northwest section. A special study is being made of what is known as the dockage system, i.e., fixing the amount of weed seeds, dirt, and



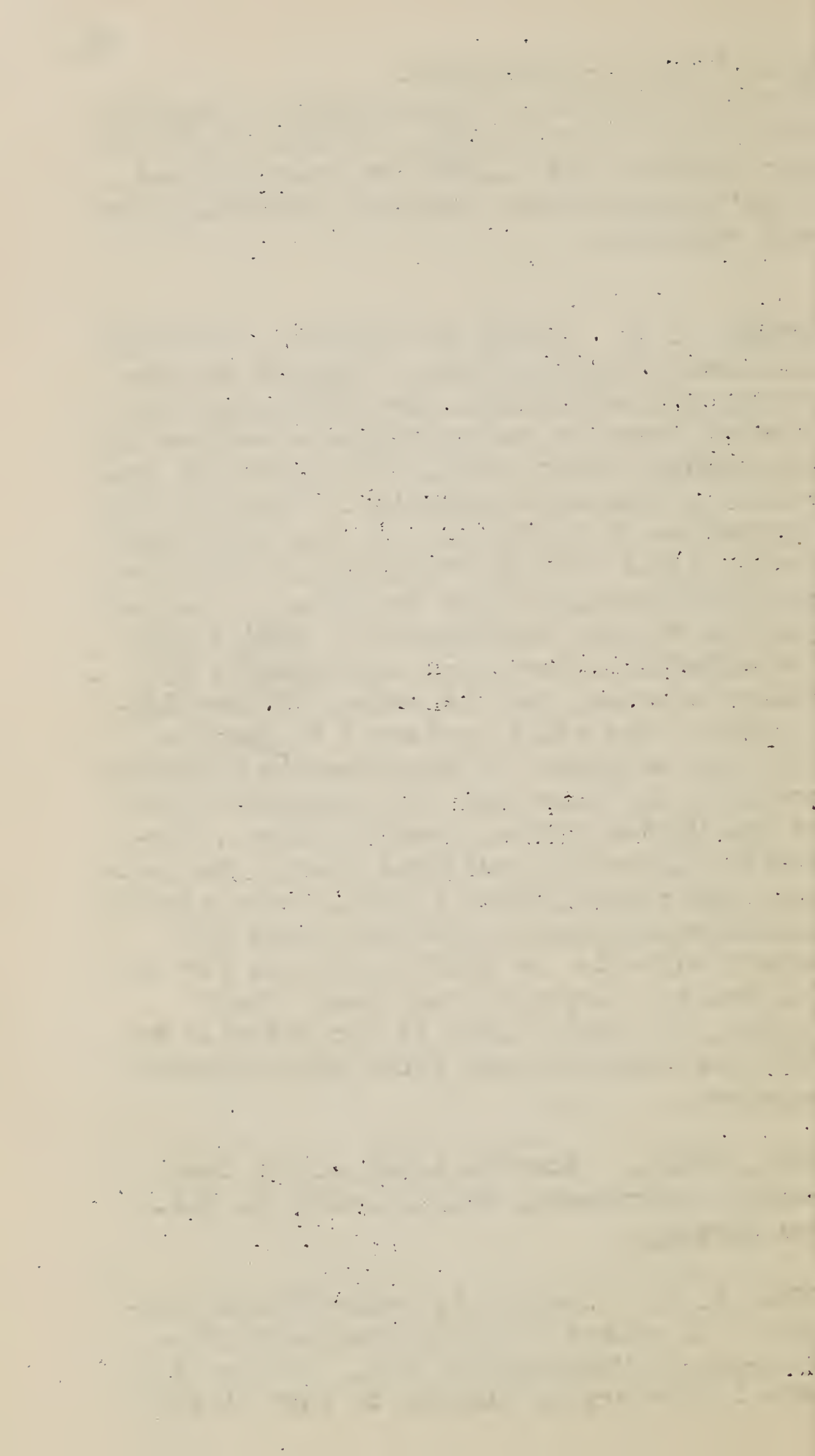
Ryder, Frank J.---Continued.

foreign material in these wheats. Expenses this year, about \$4,300, of which \$2,800 is for salaries and \$1,500 for traveling and other miscellaneous expenses, including rent and equipment.

SAFFORD, W. E. Assistant curator, Taxonomic and Range Investigations. Engaged in preparing for publication the information regarding American economic plants secured by Dr. Edward Palmer during forty years of travel as a botanical collector. The work is carried on at Washington, D. C., with incidental field work in Utah, Arizona, California, New Mexico, and also in Mexico. The object is to make available in a publication the valuable information contained in Dr. Palmer's notes, and the authentic identification of the plants referred to therein. The work embraces all the economic vegetable products of Mexico and the adjacent regions of the United States, such as fibers, dye-stuffs, tan-stuffs, medicinal plants, gums, balsams and resins, rubber plants, forage plants, sand-binders, useful woods, and trees and shrubs suitable as grafting stocks for useful fruits. Expenses this year, about \$2,000, of which \$1,800 is for salaries and \$200 for traveling and other miscellaneous expenses.

SALMON, CECIL. Special agent in dry land cereal experiments, Bellefourche, S. Dak. See Jardino.

SATTRE, A. M. Assistant, Grain Standardization. In charge of grain standardization laboratory, Minneapolis, Minn. The work at this laboratory is similar to that at the



Sattre, A. M.--Continued.

Chicago laboratory (see Carroll), and the objects of its establishment are similar to those of the Duluth laboratory (see Ryder). Expenses this year, about \$3,800, of which \$2,500 is for salaries and \$1,300 for traveling and other miscellaneous expenses, including rent and equipment.

SAUNDERS, D. A. Special agent, Cotton Breeding Investigations. Engaged in breeding cottons for northeastern and southern Texas and for Louisiana; also in the production of drought-resistant corn. Work is being conducted at Waco, Denison, Wichita Falls, Marshall, McLean, Smithville, Bartlett, and Cuero, Tex.; and at Shreveport, La. Cooperation with the Texas Experiment Station is in effect. The work consists of the breeding of long-staple Upland cottons and also of short-staple varieties with an earlier season than the native sorts. The chief object of the work is to secure varieties which may be grown in the presence of the cotton boll weevil. Breeding and hybridization work to produce a more drought-resistant corn than the varieties now grown in the South is also being carried on. Variety tests of both cotton and corn are a feature of the work. Several valuable cotton hybrids have been secured and distributed to growers for trial. Expenses this year, about \$6,000, of which \$3,000 is for salaries and \$3,000 for traveling and other miscellaneous expenses.

SAVELY, H. E. Special agent and general assistant, Farmers' Cooperative Demonstration Work. See Knapp, S. A.

SAYLOR, CHARLES F. Special agent, Sugar Beet Investigations. Engaged in investigations of beet sugar production, with headquarters at Des Moines, Iowa. This work is related to the other lines of sugar beet work conducted by the Bureau (see Townsend; also Tracy, J. E. W.). The objects are to ascertain the progress of the beet sugar industry in the United States; to develop the domestic production of sugar from beets; and to obtain knowledge of the best methods of increasing the tonnage of sugar beets. A report is submitted annually to the Secretary of Agriculture, and is published both as a Departmental and a Congressional document. Expenses this year in these investigations, about \$5,500, of which \$4,000 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

SCHWITZ, NICKOLAS. Expert in alfalfa experiments, Forage Crop Investigations. See Westgate.

SCOFIELD, CARL S. Agriculturist in charge of Western Agricultural Extension. Work is being conducted at Yuma, Ariz.; Fallon, Nev.; Bellefourche, S. Dak.; and San Antonio, Tex. At the two first-named points cooperation with the U. S. Reclamation Service is practiced. The object of the work is the extension of profitable agriculture into regions now unproductive. Trials of a large number of crops to ascertain those best suited to each region are being made. At San Antonio, Tex., the work has a special bearing on the boll weevil problem, the practicability of growing other crops in this region in rotation with cotton being demonstrated, as well as proper methods of tillage and of moisture

Scotfield, Carl S.—Continued.

conservation. All of this work is carried on in close cooperation with the office of Dry Land Agriculture Investigations (see Chilcott), and with other offices of the Bureau. Expenses this year, about \$24,500, of which \$15,000 is for salaries and \$9,500 for traveling and other miscellaneous expenses. Mr. Scotfield is assisted by Messrs. F. B. Headley, W. A. Peterson, S. J. Rogers, and S. H. Hastings.

SCOTT, W. M. Pathologist, Investigations of Diseases of Fruits. Engaged in spraying experiments and demonstrations for the control of orchard diseases. Work is being conducted at Falls City, Pawnee City, Tecumseh, Unadilla, Wabash, and Lincoln, Nebr.; Bentonsville, Pea Ridge, and Highfill, Ark.; Anderson, Springfield, and Fordland, Mo.; and Marshallville, Ga. Cooperation with the Missouri (Fruit) and the Nebraska experiment stations is in effect. The objects of the work are to perfect methods of spraying for orchard diseases and to bring about the general adoption of such methods by growers. Field demonstrations are made in individual orchards as a means to this end. In connection with these demonstrations experiments are made to determine the best treatment for certain leaf-spot diseases and other fungous diseases affecting the apple, peach, and other orchard fruits, and various fungicides are tested. Investigations are also being conducted on the brown rot of the peach, plum, and other stone fruits, the object being to obtain more complete knowledge of this destructive disease and to discover a specific remedy for it. Expenses this year in these lines of work, about \$10,000, of which \$7,500 is for salaries and \$2,500 for traveling and

Scott, W. M.--Continued.

other miscellaneous expenses. Mr. Scott is assisted by Messrs. James B. Rorer and T. W. Ayres.

SHAMEL, A. D. Physiologist, in charge of Cigar Tobacco Investigations and Farmers' Cooperative Breeding Work. This work includes breeding, rotation, and demonstration work with tobacco, potatoes, asparagus, vetch, cereals, and cotton. Work is being conducted at Hockanum, Granby, Tariffville, Suffield, and Hartford, Conn.; Concord and Southwick, Mass.; Germantown, Ohio; Lexington, Hopkinsville, and Farmington, Ky.; Clarksville, Tenn.; Tallahassee and Quincy, Fla.; and Hoschton, Gainesville, Thompsons Mills, and Flowery Branch, Ga. Close cooperation with the State experiment stations is in effect. The work consists of breeding, fertilizer tests, curing experiments, and demonstrations of crop rotation with tobacco; the breeding of rust-resistant asparagus; the improvement of potatoes by breeding and selection; the breeding of vetches and cereals as cover crops for tobacco fields; cooperative cotton breeding demonstrations in Georgia; the testing of fine-ground feldspar as a potash fertilizer; and experiments in the control of the root-rot and other diseases of tobacco. The work has for its objects the improvement, by hybridization and selection, of tobacco, cotton, and the other crops under experiment; the improvement of methods of growing and handling these crops; and the securing of suitable crops for use as cover crops and in crop rotations. Demonstrations of the value of improved cultural methods, seed selection, etc., are an important feature of the work. Expenses this year in these lines of work, about \$20,000, of which \$12,000 is for sala-

Shamel, A. D.—Continued.

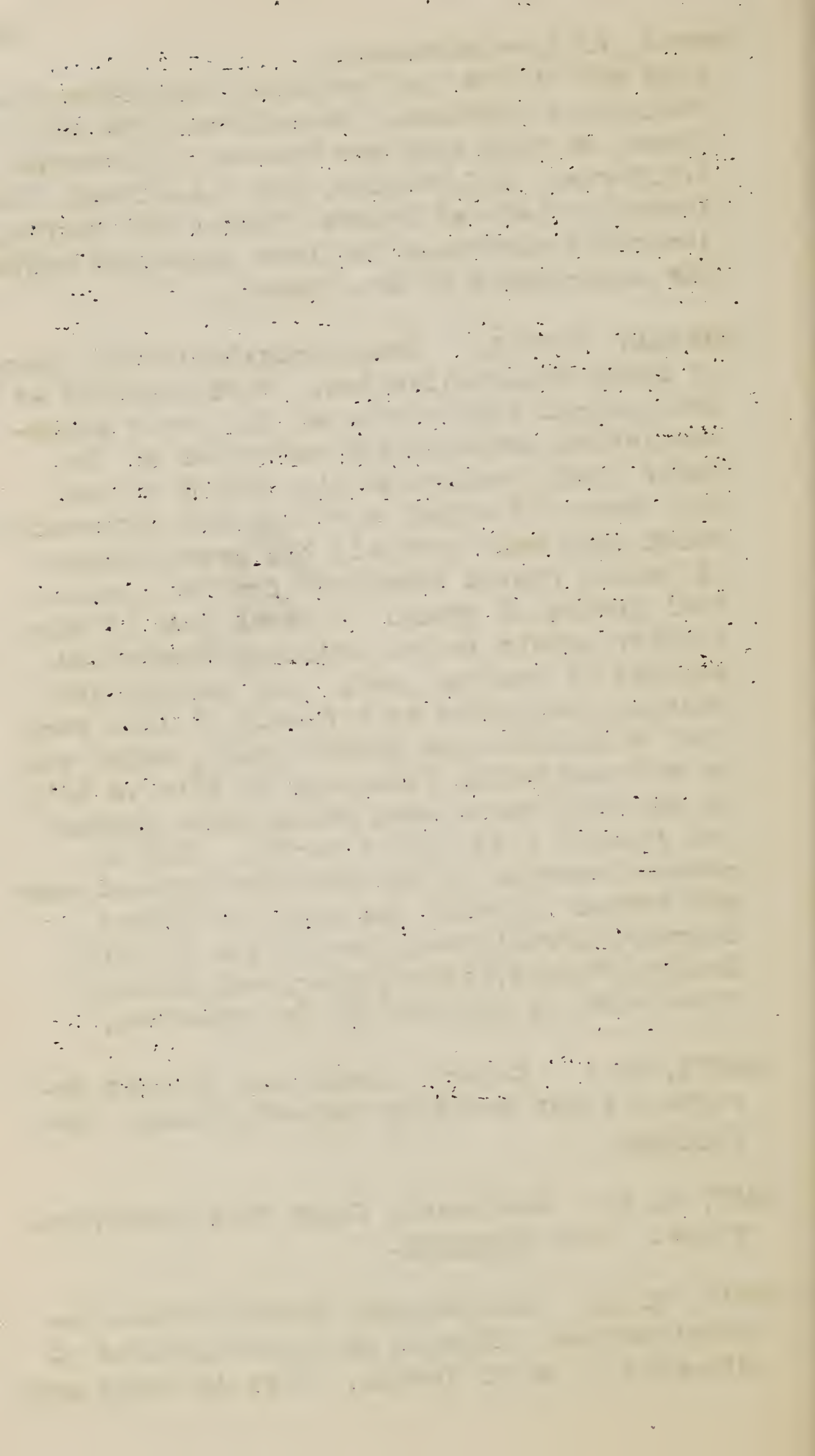
ries and \$8,000 for traveling and other miscellaneous expenses. Associated with Mr. Shamel in this work are Messrs. J.B. Stewart, J.B. Norton, H.C. Woosley, and H.A. Allard. The investigations of Messrs. Hinson and Harris, described elsewhere in these pages, are under the supervision of Mr. Shamel.

SHANAHAN, JOHN D. Crop technologist in charge of Grain Standardization. Work consists of the general supervision of the grain standardization laboratories conducted at the chief grain centers of the United States, the object of which is to collect information which will make possible the establishment of United States standards for the commercial grades of grain. A great lack of uniformity exists in the ordinary commercial methods of grading grain, and dealers are becoming convinced as a result of this work that a definite and honest grade, which can be mathematically fixed and is fair to all, is the only basis upon which grain grading can finally rest with security. The expenses incurred in the work the present year are stated opposite the names of Messrs. Boerner, Carroll, Duval, Duval, Fitz, Jeffers, Leighty, Morris, Richey, Ryder, and Sattre, whose work is directed by Mr. Shanahan.

SHANTZ, H. L. Expert, Alkali and Drought Resistant Plant Breeding Investigations. See Kearney.

SHAW, H. B. Assistant, Sugar Beet Investigations. See Townsend.

SHEAR, C. L. Pathologist, Fruit Disease Investigations. Engaged in investigations of diseases of small fruits. Work is being done



Shear, C. L.--Continued.

at Brewster and Pleasant Lake, Mass.; Vineland, N.J.; Kendaia, N.Y.; Northeast, Pa.; Paw Paw and Lawton, Mich.; and Grand Rapids, Wis. Nominal cooperation with the Pennsylvania Experiment Station is in effect. The work on small fruits is at present devoted chiefly to diseases of the grape and cranberry. The objects are the securing of a complete knowledge of the fungous parasites and other pathological factors which produce the diseases, especially the methods of growth, reproduction, distribution, and manner of infection of the organisms, and also the most practical, economic, and effective means of combating them. Spraying experiments and demonstrations in accordance with the most recent developments in fungicides and machinery are being made. Expenses this year in these lines of work, about \$9,000, of which \$7,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses. Dr. Shear is assisted by Messrs. George F. Miles and L. A. Hawkins, and Mrs. Anna K. Wood.

SHEAR, W. V. Assistant, Arlington Experimental Farm. See Corbett.

SHOEMAKER, D. N. Expert in charge of Cotton Breeding Investigations. Personally engaged in laboratory work on cotton and in breeding cottons for northern Texas. The laboratory work is conducted at Washington, D.C., while the field work in northern Texas is carried on at Palestine and Paris, in cooperation with the Texas Experiment Station. The laboratory work includes microscopic examinations of cotton fiber to find the origin of weak fibers; to learn the nature and extent of gin damage and the conditions under which cotton can best be ginned; to ascertain what

Shoemaker, D. N.--Continued.

effect storm and exposure have on quality of lint; and to investigate the early growth of cotton fiber, in the hope of throwing additional light on cotton breeding problems. The laboratory work is a necessary aid to the breeding of improved varieties of cotton under field conditions. The work of breeding cottons for northern Texas consists of two phases, namely, the breeding of cotton for the black land belt, and breeding for the sandy land belt. The objects are to obtain better yielding and earlier strains of short staple varieties, as well as improved long staple cottons. Distribution of the seed of improved varieties is made each year to growers for trial. Expenses this year in these lines of work, about \$3,000, of which \$2,000 is for salaries and \$1,000 for traveling and other miscellaneous expenses. The investigations of Messrs. Bain, Boykin, and Saunders, described elsewhere in these pages, are under the supervision of Dr. Shoemaker.

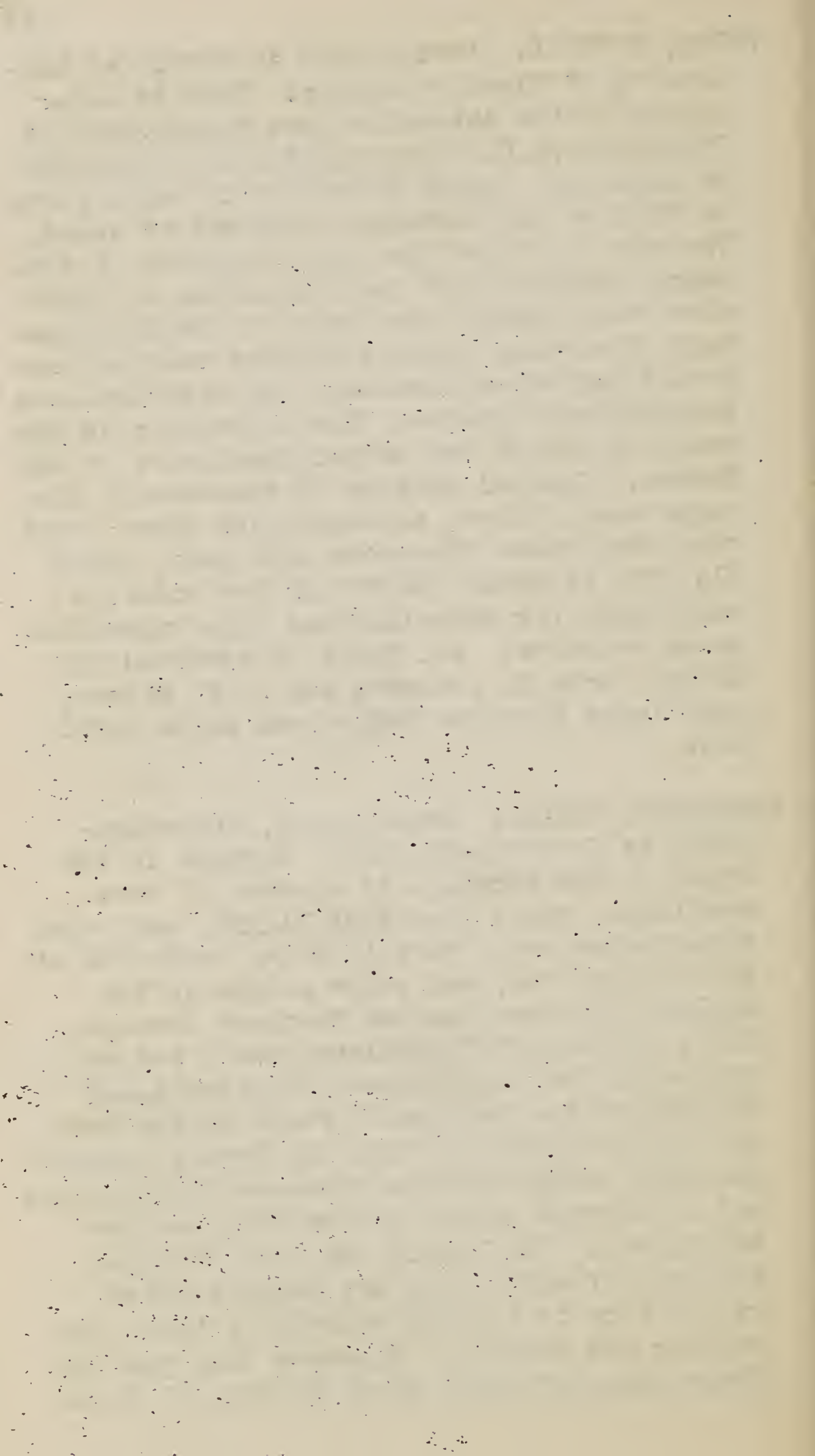
SIEVERS, A. F. Expert, Drug Plant Investigations. See True.

SKEELS, H. C. Assistant, Economic Collections. See Wight.

SMITH, C. B. Assistant agriculturist, Farm Management Investigations. In general charge of investigations of special phases of farm practice. Work consists of the general supervision of the studies of special phases of farming conducted by Messrs. Beavers, Cates, Cotton, and McClure, described elsewhere in these pages. This work is conducted in all parts of the United States. Expenses this year in supervising the work, about \$5,500, of which \$4,500 is for salaries and \$1,000 for travel, etc.

SMITH, ERWIN F. Pathologist in charge of Laboratory of Plant Pathology. Work is conducted in the laboratory and greenhouses at Washington, D.C., with incidental field work as required. Chief attention is being given to fungous and bacterial diseases of crops. The work includes the identification of diseased specimens and the suggestion of remedies where known; the study of the life history of various plant parasites causing bacterial and other diseases; and miscellaneous pathological studies. The laboratory is the basis of all of the pathological work of the Bureau. Special studies of diseases of the sugar cane, olive, coconut, and other crops are being made. Expenses this year, about \$19,000, of which \$14,000 is for salaries and \$5,000 for traveling and other miscellaneous expenses. Dr. Smith is assisted by Messrs. John R. Johnston and J. F. Brewer, and Misses Florence Hedges and Lucia McCulloch.

SPAULDING, PERLEY. Pathologist, Investigations in Forest Pathology. Engaged in the study of the damping-off disease of tree seedlings, white pine leaf blight, and other forest diseases. Work is being conducted at Burlington, Vt., and other points in New England; Saranac Inn and Westbury Station, N.Y.; Biltmore, N.C.; Halsey, Nebr.; and at points in New Mexico, Idaho, California, and throughout the National Forests in the West, in close cooperation with the Forest Service. The work covers various diseases of deciduous and coniferous trees, forest tree nursery stock, etc. The blight and leaf dropping diseases of white pine are being studied with a view to finding methods of their prevention and control. Expenses this year in these lines of work, about \$2,750, of which



Spaulding, Perley—Continued.

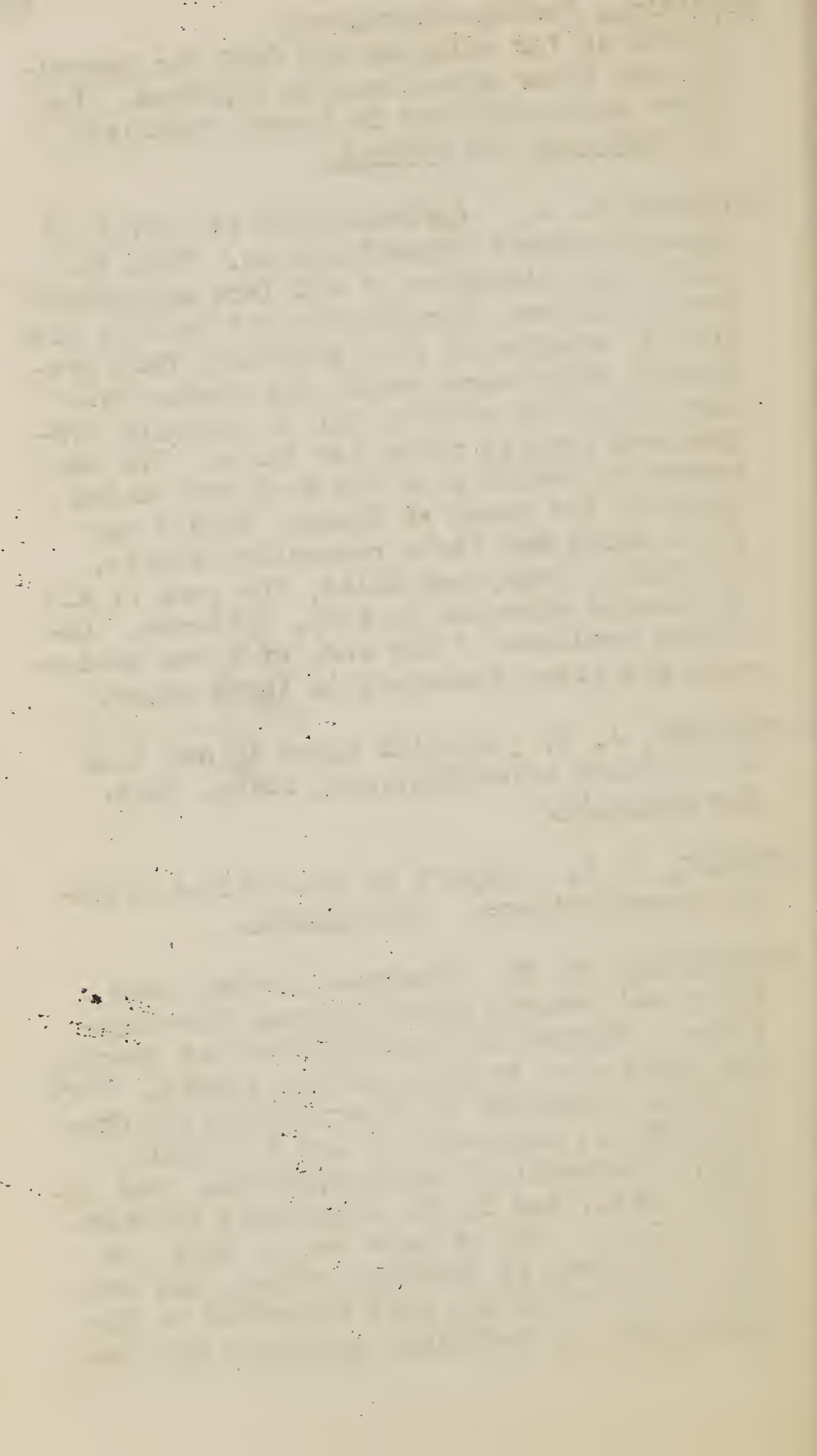
\$1,800 is for salaries and \$950 for traveling and other miscellaneous expenses. For other investigations in Forest Pathology see Hedgcock and Metcalf.

SPELLMAN, W. J. Agriculturist in charge of Farm Management Investigations. Work includes the direction of all farm management investigations, farm management work by districts, studies of farm practice, farm economics, range management, and cactus culture; also the working out of cropping systems and general plans for farms. The expenses connected with the work are stated opposite the names of Messrs. Brodie and C. B. Smith and their respective staffs, Griffiths, Peck, and Ellis, the work of all of whom is directed by Prof. Spellman. Detailed outlines of the work of these assistants are given elsewhere in these pages.

STEPHENS, J. M. Special agent in dry land agriculture investigations, Utica, Mont. See Chilcott.

STEWART, J. B. Expert in Connecticut tobacco investigations. See Shamel.

STOCKBERGER, W. W. Pharmacognosist, Drug Plant and General Physiological Investigations. Engaged in investigations of American hops; also tanning and dye plants. Work is being conducted at Waterville, N.Y.; Chehalis, Wash.; Independence and Reedville, Oreg.; Pleasanton, Wheatland, Perkins, and Cosumne, Cal.; and in the laboratory at Washington, D.C. The objects are to work out the conditions of growing, curing, and handling hops which are most favorable to the development of desirable qualities and con-



Stockberger, W. W.--Continued.

stituents. A study of the relation between quality and the conditions mentioned is being made both in the field and in the laboratory. Work is also in progress in the selection and breeding of hops for disease resistance, early maturity, and improved quality. The subjects of these investigations are to remove the present discrimination against American hops which exists in many markets because of a supposed inferiority of the American product. The work on tanning and dye plants is conducted incidentally to the work on hops, and has as its general aim the development of industries in the production of this class of plants. Expenses this year, about \$5,000, of which \$3,500 is for salaries and \$1,500 for traveling and other miscellaneous expenses.

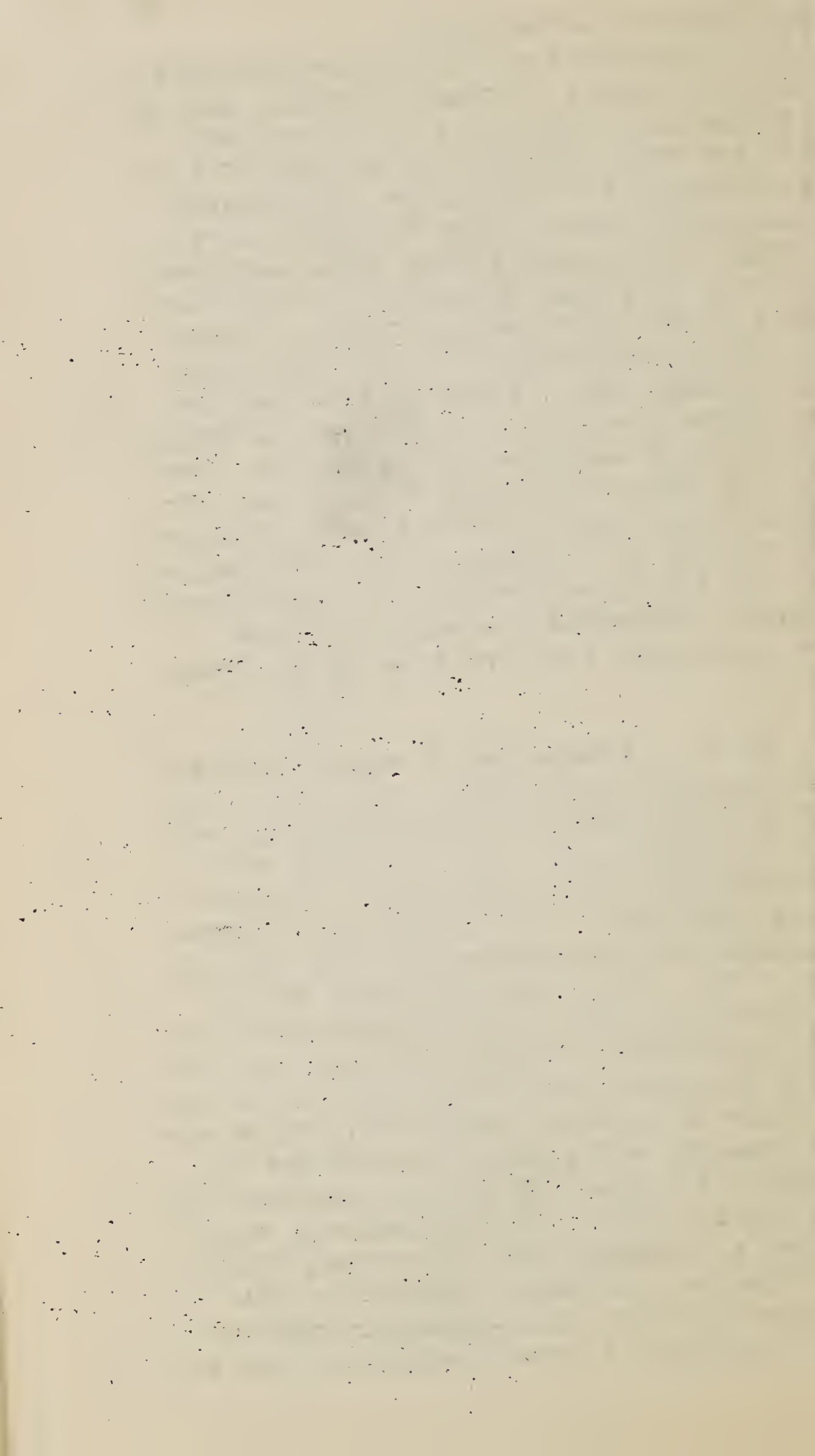
STUBENRAUCH, A. V. Expert in fruit transportation and storage investigations in California. See Powell.

SWINGLE, WALTER T. Physiologist in charge of Plant Life History Investigations. Personally engaged in investigations of the life history of the date palm, the breeding of new varieties, and the establishment of date culture on a commercial scale in California, Arizona, and Texas, cooperative date gardens being maintained at Indio and Mecca, Cal., and at Larodo, Tex.; similar work on figs and caprifigs, the pistache and its wild relatives, the Chinese date or jujube, etc.; investigations of methods of cooperative plant breeding, especially of citrus fruits, the date, fig, and other crop plants; investigations of the application of electricity to plant culture, in cooperation with the Physical Laboratory; and the operation of testing

Swingle, Walter T.--Continued.

and demonstration farms in cooperation with the Indian Service at Sacaton, Ariz., and on the Indian Reservations of the Southwest, having for their objects the testing of new crops suitable for culture by the Indians and educating Indian labor to handle cotton and other crops grown by the white settlers. All of the work just described is conducted chiefly in the Southwestern States. Breeding work on citrus fruits is carried on at Glen St. Mary, Fla. Expenses this year in these lines of work, about \$16,500, of which \$12,000 is for salaries and \$4,500 for traveling and other miscellaneous expenses. Mr. Swingle is assisted by Messrs. W. L. Flanery, E. M. Savage, E. W. Hudson, and Bruce Drummond; and the investigations of Messrs. Brand and Mason, described elsewhere in these pages, are under the direction of Mr. Swingle.

TAYLOR, WM. A. Pomologist in charge of Field Investigations in Pomology. Personally engaged in fruit marketing investigations and pecan investigations. Work is being conducted at South Glastonbury, Conn.; Carleton Station and Ghent, N.Y.; Wyoming, Del.; Charlottesville and Winchester, Va.; Paw Paw and Keyser, W. Va.; Centralia, Ill.; Fort Valley and Dewitt, Ga.; and Orange Heights and other points in Florida. The fruit marketing work has for its object the development of an export trade in peaches, summer and winter apples, pomelos, and pineapples; and the improvement of methods of packing and handling these fruits, with a view to insuring their delivery to consumers in attractive, sound, and wholesome condition, especially with reference to their trans-Atlantic exportation. The work is closely allied to and in



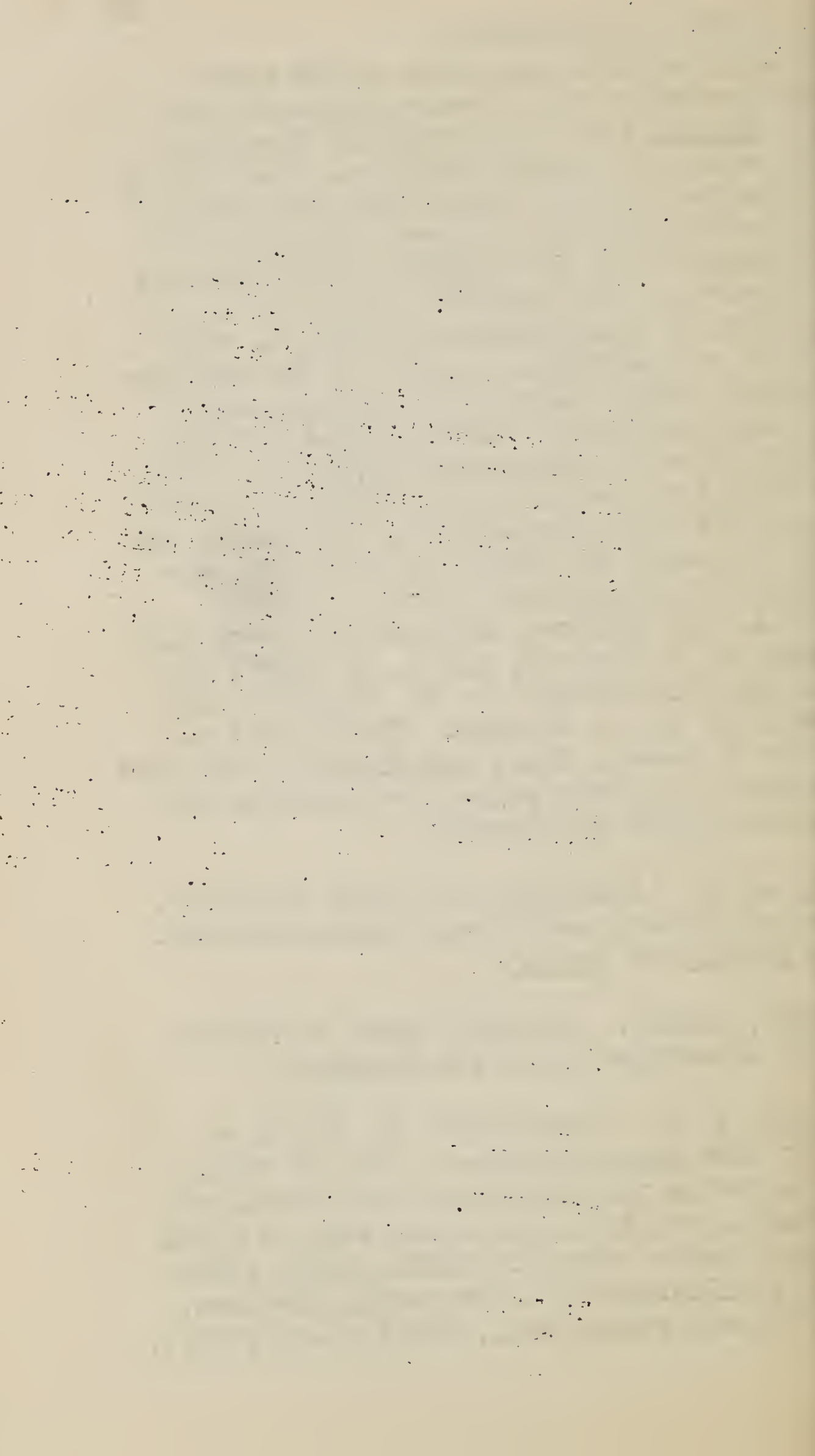
Taylor, Wm. A.--Continued.

certain respects dependent on the fruit transportation and storage investigations (see Powell); and the Bureau of Chemistry cooperates on certain features. The work on pecans has for its object the determination of the adaptability of pecan varieties to different soils and climatic conditions and to ascertain the locations where pecan culture can be successfully carried on, especially in the South. In all of the work cooperation with individual fruit growers is largely practiced. Expenses this year in these lines of work, about \$9,000, of which \$5,000 is for salaries and \$4,000 for traveling and other miscellaneous expenses. Associated with Mr. Taylor in the fruit marketing investigations is Mr. G. Harold Powell, and they are assisted by Messrs. L. S. Tenny, G. W. Hosford, and H. M. White. In the pecan investigations Mr. Taylor is assisted by Mr. C. A. Reed. The investigations of Messrs. Gould and Husmann, described elsewhere in these pages, are directed by Messrs. Taylor and Powell.

TENNY, L. S. Pomologist in fruit marketing, transportation, and storage investigations. See Powell and Taylor.

TOURNIER, ALFRED. Special agent in viticultural investigations. See Husmann.

TOWNSEND, C. O. Pathologist in charge of Sugar Beet Investigations. Work is being conducted in the laboratory and greenhouse at Washington, D. C., and field work is being carried on at Fairfield, Wash.; Sugar City, Idaho; Billings, Mont.; Brookings, Aberdeen, and Bellefourche, S. Dak.; North Platte, Nebr.;

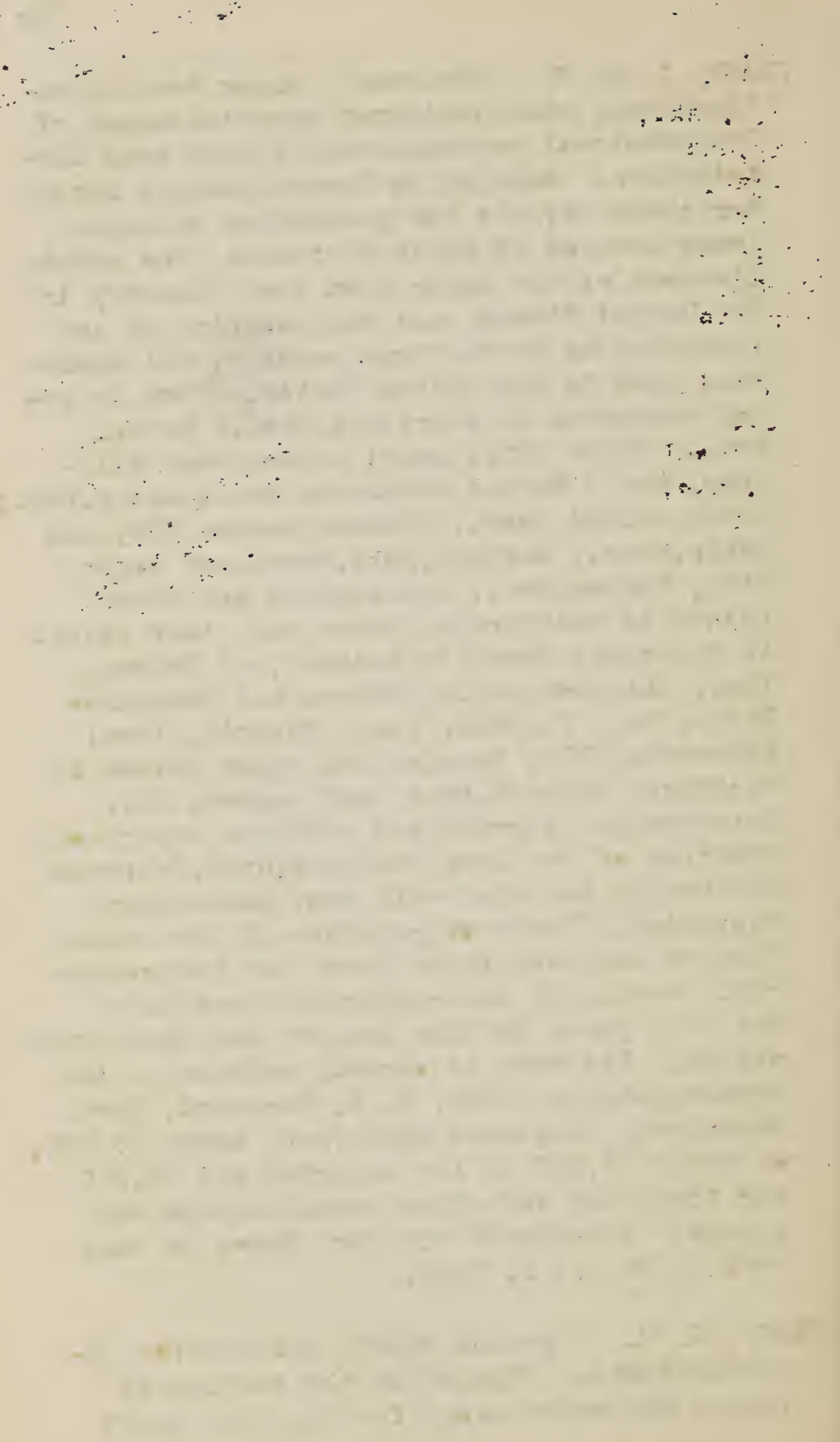


Townsend, C. O.—Continued.

Garden City and Lakin, Kans.; Garland, Lehi, and Nephi, Utah; Fallon, Nev.; Rocky Ford and Akron, Colo.; Las Vegas and other points in New Mexico; Compton, Cal.; Amarillo and McLean, Tex.; St. Paul, Minn.; Hazelton, Iowa; and Lansing and other points in Michigan. Cooperation with the experiment stations of Minnesota and South Dakota, with sugar companies in Utah, Michigan, and Kansas, and with several hundred farmers is under way. The objects of the work are to find practical methods for controlling the diseases of the sugar beet; to produce single-germ beet seed; to improve the yield and quality of the beets; to produce strains resistant to alkali and drought, as well as early maturing strains; to find the best method of siloing seed beets; to extend sugar beet culture into localities where the soil and climate seem favorable to the development of the industry; and to determine the cultural methods best suited to sugar beet production. In the work on sugar beet diseases, some incidental attention is also being devoted to diseases of various related plants, such as alfalfa, clover, spinach, and the cultivated daisy. Tests of fertilizers for sugar beets are also being made. The work is related in part to certain phases of the investigations of Messrs. Chilcott, Kearney, and Scofield, described elsewhere in these pages. Expenses this year, about \$20,000, of which \$11,000 is for salaries and \$9,000 for traveling and other miscellaneous expenses. Dr. Townsend is assisted by Messrs. E. C. Rittue and H. B. Shaw and by Misses Nellie A. Brown and Clara O. Jamieson.

TRACY, J. E. W. Assistant, Sugar Beet Investigations; also assistant superintendent of Congressional vegetable and flower seed distribution. Engaged in investigations having for their objects the production of high-grade strains of sugar beet seed, the establishment of the sugar beet seed industry in the United States, and the securing of information as to the true worth of all varieties used in the United States. Work is being conducted at Fairfield, Wash.; Union, Oreg.; Sugar City, Idaho; Bozeman and Billings, Mont.; Bellefourche and Brookings, S. Dak.; Grand Island, Nebr.; Ashland, Garden City, and Lakin, Kans.; Garland, Lehi, Nephi, and Logan, Utah; Fallon, Nev.; Los Angeles and other points in California; Akron and other points in Colorado; Amarillo, Dalhart, and McLean, Tex.; Chippewa Falls, Madison, and Menominee Falls, Wis.; St. Paul, Minn.; Waverly, Iowa; Riverdale, Ill.; Lansing and other points in Michigan; Fremont, Ohio; and Geneva, N. Y. Cooperation is practiced with the experiment stations of New York, Michigan, Utah, Colorado, and Oregon, and also with many beet-sugar factories. The work consists of the selection of the best roots grown and the commercial testing of the comparative merits of the seed grown in this country and that grown abroad. The work is closely related to the investigations of Dr. O. O. Townsend, just described. Expenses this year, about \$5,000, of which \$3,200 is for salaries and \$1,800 for traveling and other miscellaneous expenses. Associated with Mr. Tracy in this work is Mr. J. F. Reed.

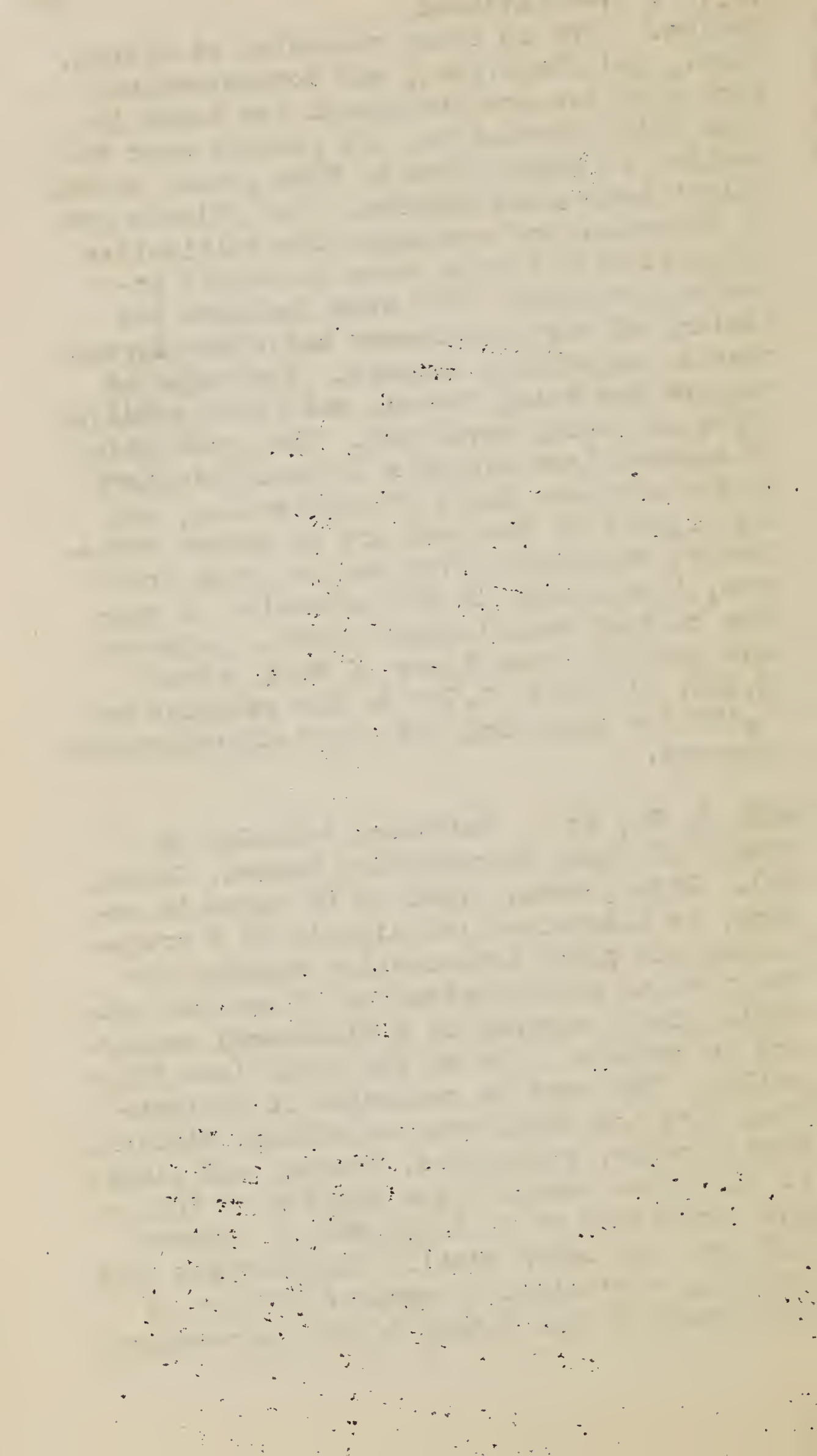
TRACY, S. M. Special agent, Forage Crop Investigations. Engaged in the testing of forage and cover crops for the Gulf coast



Tracy, S. M.—Continued.

region. Work is being conducted at Biloxi, Miss., and Miami, Fla.; and demonstration work with farmers throughout the South is also being carried on. At present much attention is being given to Para grass, vetch, velvet beans, and cassava. The objects are to introduce and encourage the cultivation of profitable forage crops in weevil infested districts. The work includes the testing of various grasses and other forage plants, especially legumes. Varieties of cassava are being tested, and fixed seedling types are being developed. The propagation of cassava from cuttings is unsatisfactory at the northern limit of cultivation, and the objects of the work are to secure satisfactory varieties which can be grown from seed, thus aiding in the extension of cassava culture much farther north. Expenses this year in these lines of work, about \$3,400, of which \$2,000 is for salaries and \$1,400 for traveling and other miscellaneous expenses.

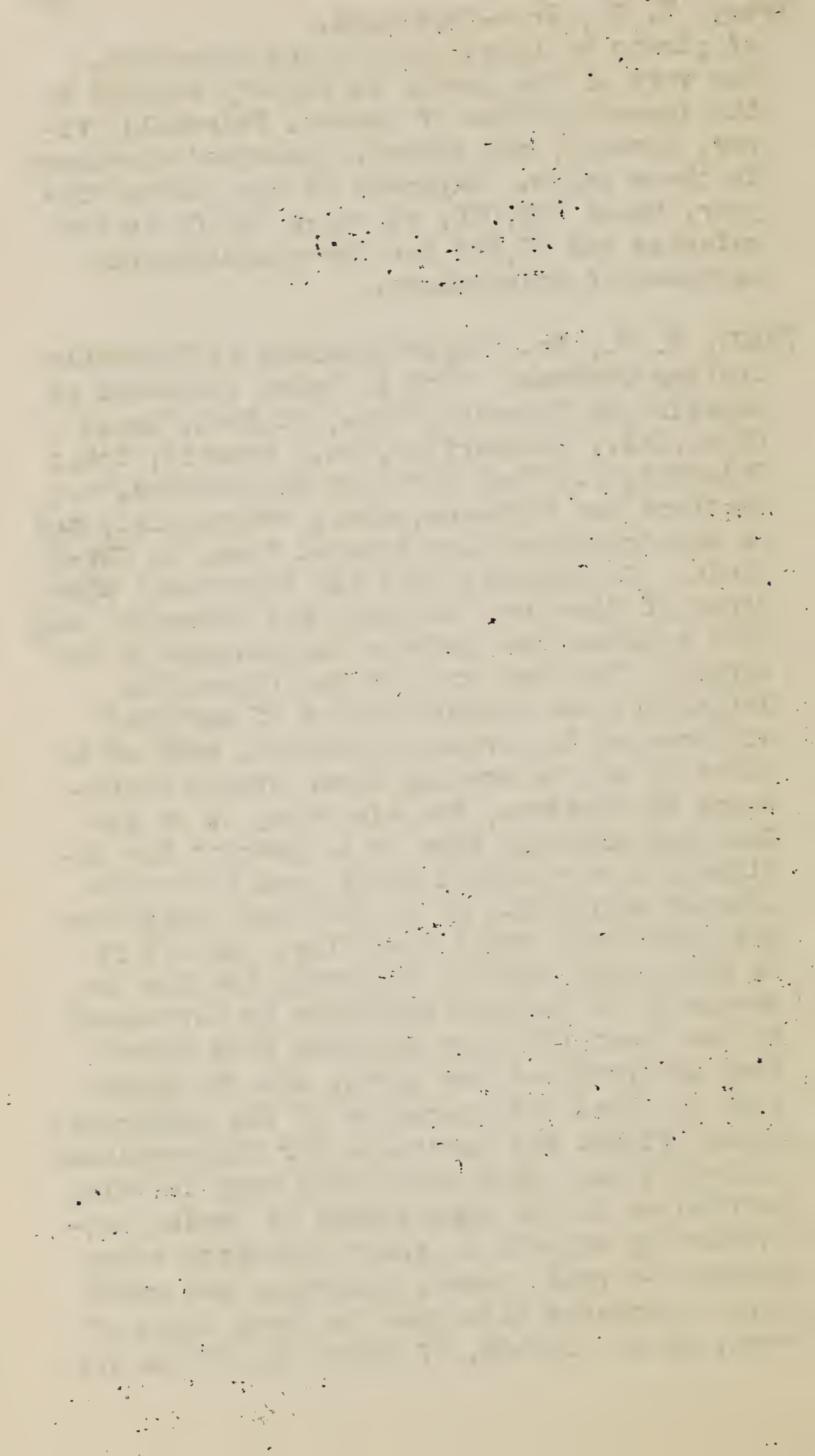
TRACY, W. W., Jr. Assistant botanist in charge of Plant Introduction Garden, Chico, Cal. This garden, which is 80 acres in extent, is maintained principally as a propagating and plant introduction station for the testing and distribution of new and valuable plants secured by agricultural explorers in various parts of the world (see Fairchild). The work is conducted in cooperation with the California experiment station. Forage crops, vegetables, fruits, and plants of all kinds except those adapted to tropical conditions or to latitudes of extreme cold are now under trial. Considerable work is being carried on by various offices of the Bureau at the Garden in the improvement



Tracy, W. W., Jr.--Continued.

of plants by hybridization and selection. The work of the garden is closely related to the investigations of Messrs. Fairchild, Piper, Husmann, and others, described elsewhere in these pages. Expenses of the garden this year, about \$12,000, of which \$6,500 is for salaries and \$5,500 for the miscellaneous expenses of maintenance.

TRACY, W. W., Sr. Superintendent of Vegetable Testing Gardens. Work is being conducted at Lincoln and Waterloo, Nebr.; St. Paul, Minn.; Chico, Cal.; Brownsville, Tex.; Detroit, Mich.; Columbia, Mo.; West Hartford and Rutland, Vt.; Hartford and Hockanum, Conn.; Auburn, Ala.; and on the Arlington Experimental Farm, in Virginia. Cooperation with the experiment stations of Missouri, Alabama, and Nebraska, and with seedsmen and private individuals is in effect. The work has for its object the definition and classification of varietal differences in garden vegetables, both as to those in common use and newer stocks introduced by seedsmen, the aim being to so define and classify them as to prevent the duplication of varietal names, and to secure greater uniformity as to the exact variation any given name shall stand for. An effort is also being made to ascertain how far the character of garden vegetables is influenced by the location where the seed from which they are produced was grown; also to ascertain by trial the character of the commercial seeds offered and purchased for Congressional distribution. Some incidental work is being carried on in the improvement of garden vegetables by selection, chief attention being devoted to peas, beans, tomatoes, and sweet corn. Expenses this year in these lines of work, about \$12,000, of which \$11,000 is for



Tracy, W. W., Sr.--Continued.

salaries and \$1,000 for traveling and other miscellaneous expenses. This work is conducted in close association with that of Prof. L. C. Corbett, previously described.

TRUE, RODNEY H. Physiologist in charge of Drug Plant, Poisonous Plant, and General Physiological Investigations. Personally engaged in investigations of the relation of methods of growing and handling lemons to their keeping quality; of the production and utilization of camphor in the United States; the production of denatured alcohol from second-grade potatoes, unmarketable fruit, sorghum and other crops, waste products of the farm, etc.; experimental tests of various drug-producing plants from both foreign and domestic sources; experiments and demonstrations in red pepper growing for spice purposes, and in the production of perfumery plants and volatile oils on a commercial scale; and investigations of the production of tea in commercial quantities in the United States. Work is being conducted at Madison, Wis; Riverside and other points in California; Summerville and Timmons ville, S. C.; Orange City, Fla.; Pierce, Tex.; and on the Arlington Experimental Farm, Virginia. The work on camphor is concerned with the growing and utilization of camphor trees for the production of gums and oils. The work on denatured alcohol is in its beginning and consists of tests of alcohol production from promising farm products, such as potatoes, sweet potatoes, cassava, etc. The drug plant tests have for their objects the testing in different localities of important native and foreign drug plants with a view to learning the best methods of their home production on a commercial scale. Much labora-

True, Rodney H.--Continued.

tory work is connected with these investigations. The work on tea has for its objects the ascertaining of the practicability of growing and manufacturing tea on a profitable commercial basis, and to work out the relation between quality and constituents, with a view to the improvement of processes and product. The work consists of both field and factory tests, as well as laboratory investigations. Expenses this year in these lines of work, about \$28,000, of which \$15,000 is for salaries and \$13,000 for traveling and other miscellaneous expenses. Dr. True is assisted by Messrs. S. C. Hood, Frank Rabak, G. F. Klugh, T. B. Young, G. F. Mitchell, and A. F. Sievers, and by Miss Alice Henkel. The investigations of Messrs. Alsborg, Marsh, and Stockberger, described elsewhere in these pages, are directed by Dr. True.

TULL, JOHN H. Expert, Arlington Experimental Farm. See Corbett.

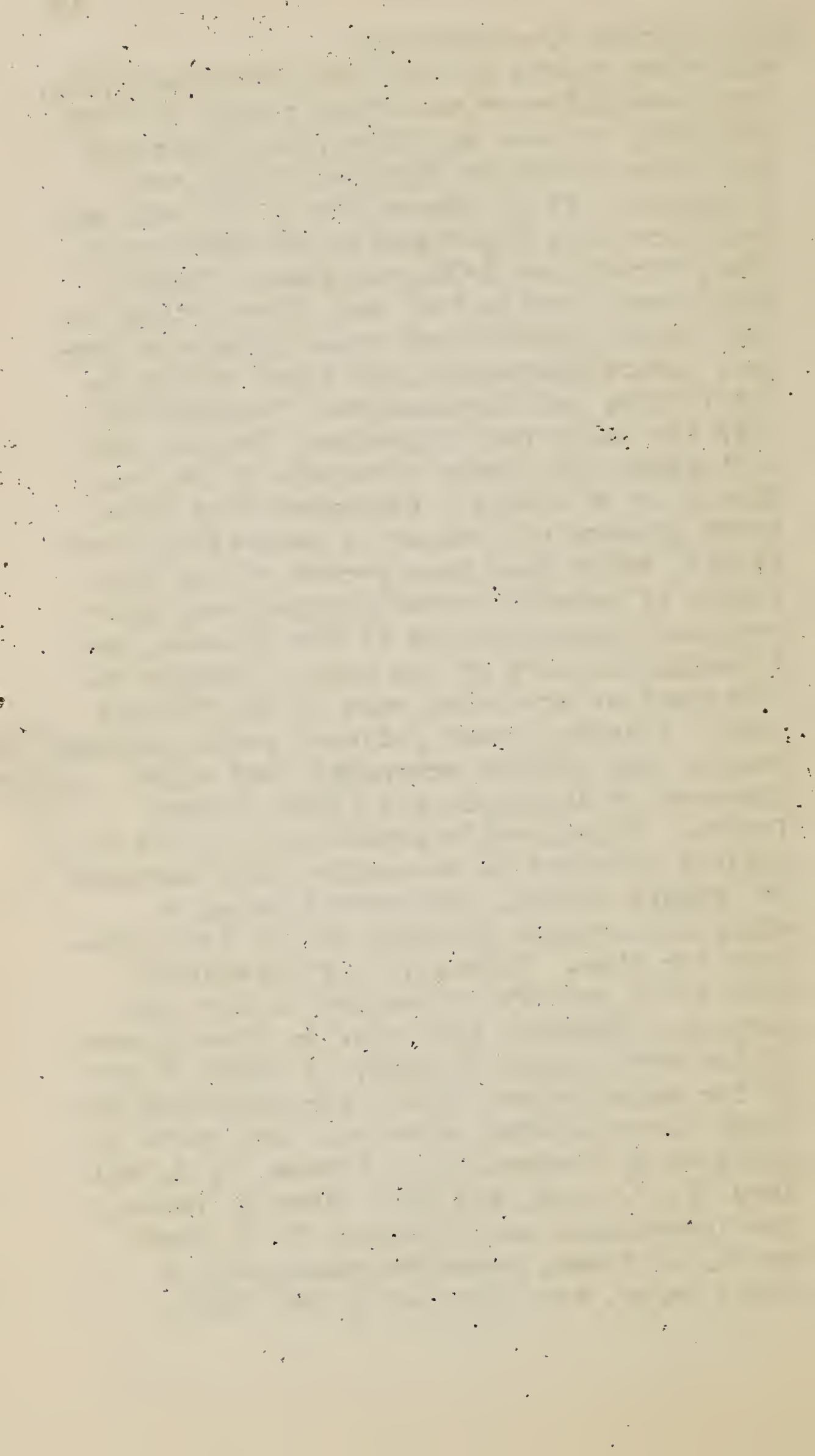
UTBERGER, H. J. C. Assistant agronomist, Grain Investigations. See Carleton.

VINALL, H. N. Assistant in grass experiments, Forage Crop Investigations. See Cakley.

WAITE, MERTON B. Pathologist in charge of Investigations of Diseases of Fruits. Personally engaged in experiments and demonstrations in the eradication of pear blight, the "little peach" disease and peach yellows, various crown-gall diseases, etc. Work is being conducted at Seymour, Conn.; Youngstown

Waite, Merton B.—Continued.

and other points in New York; Waynesboro, Pa.; Martinsburg, Keyser, and other points in West Virginia; Thomson and Cairo, Ga.; Saugatuck and other points in Michigan; Olney and Bloomington, Ill.; Geneva, Nebr.; St. Louis and Louisiana, Mo.; Fayetteville and Farmington, Ark.; Topeka and Arlington, Kans.; Shenandoah, Iowa; Mesilla Park and other points in New Mexico; Medford and other points in Oregon; Auburn, Sacramento, and other points in California; and Richmond, Va. Cooperation with the California Experiment Station and with State and county officials in various States is in effect. Demonstrations among fruit growers of methods of controlling pear blight, which have been worked out as the result of careful bacteriological and microscopical investigations of the disease, are a leading feature of the work. Similar investigations are being made of the "little peach" disease, peach yellows, peach gumming fungus, and various crown-gall and other diseases of the apple and other orchard fruits. Considerable attention is given to various problems in connection with diseases of orchard fruits, the attempt being to study all orchard diseases and to find remedies for them. Extensive correspondence with fruit growers is carried on for this purpose. Expenses this year in these phases of the work, about \$12,000, of which \$7,000 is for salaries and \$5,000 for traveling and other miscellaneous expenses. Mr. Waite is assisted by Messrs. P. J. O'Gara, W. S. Ballard, F. V. Rand, and Miss Clara H. Hasse. The investigations of Messrs. W. M. Scott and C. D. Shear, described elsewhere in these pages, are directed by Mr. Waite.



WARBURTON, C. W. Assistant agronomist, Grain Investigations. Engaged in the introduction, adaptation, and improvement of oat varieties. Work is being conducted at Brookings, S. Dak.; Agricultural College, N. Dak.; Bozeman, Mont.; St. Paul, Minn.; Madison, Wis.; McPherson, Kans.; Amarillo, Tex.; Knoxville, Tenn.; McLean, Ill.; College Park, Md.; and on the Arlington Experimental Farm, Virginia. The objects of the work are the improvement of varieties and methods of cultivation, special attention being given to the development of hardier winter strains; the introduction of new varieties into regions to which they are believed to be especially adapted with reference to local soil and climatic conditions; and the testing of a large number of hybrids and selections which have been made with a view to securing strains which are productive, resistant to lodging and disease, of good color, and of high milling and feeding quality. Expenses this year, about \$4,000, of which \$3,000 is for salaries and \$1,000 for traveling and other miscellaneous expenses. Mr. Warburton is assisted by Mr. L. C. Burnett.

WARREN, J. A. Assistant agriculturist, Farm Management Investigations. In charge of work in District No. 7, embracing Iowa, Missouri, Kansas, Nebraska, and eastern Colorado. (See Brodie.) The work in this district is essentially similar to that in the other farm management districts. Expenses this year, about \$2,800, of which \$1,600 is for salaries and \$1,200 for traveling and other miscellaneous expenses.

WESTER, P. J. Assistant in charge of Subtropical Garden, Miami, Fla. Work includes the acclimatization of plants introduced from different parts of the world; the breeding of improved varieties of subtropical and tropical plants; and the development of improved methods of propagating subtropical fruit trees. The objects of the garden are to determine the possibilities of southern Florida in horticulture, and to test various seeds and plants believed to be adapted to that region. Expenses this year, about \$8,000, of which \$5,000 is for salaries and \$3,000 for miscellaneous expenses of maintenance.

WESTGATE, J. M. Assistant agrostologist, Forage Crop Investigations. Engaged in the introduction and extension of alfalfa and clover. Work is being conducted chiefly at Pullman, Wash.; Chico, Cal.; Chillicothe, Tex.; and on the Arlington Experimental Farm, Virginia. Cooperative experiments are also under way with the experiment stations of New York, Maryland, Virginia, North Carolina, Alabama, Mississippi, Ohio, and Indiana, and also in Kansas, Colorado, Nebraska, Oregon, Idaho, North Dakota, South Dakota, Minnesota, Wisconsin, and New Mexico. The work in the West has for its object the introduction of new varieties of alfalfa, especially drought-resistant strains in the semiarid sections, hardy strains in the northern plains region, and Arabian alfalfa in the Southwest. Work concerned with the extension of alfalfa culture is principally confined to those sections where alfalfa is not as staple a crop as there is reason to believe it should be. Demonstrations in cooperation with farmers of the best methods of securing and main-

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Westgate, J. M.--Continued.

taining a stand in different sections of the country are being conducted. The encouragement of alfalfa culture in the East is a prominent feature of the work. Incidental work is being carried on with clovers along the same lines as that with alfalfa. Expenses this year, about \$7,000, of which \$4,500 is for salaries and \$2,500 for traveling and other miscellaneous expenses.

WHEELER, C. F. Expert, Economic Collections.
See Wight.

WHITE, H. M. Assistant in fruit marketing, transportation, and storage investigations.
See Powell; Taylor.

WIGHT, W. F. Assistant botanist, Taxonomic and Range Investigations. In charge of Economic Collections. The work is mainly performed at Washington, D. C., in cooperation with various other branches of the Bureau, supplemented by field work. The objects are the preservation in permanent form of specimens of all introduced plants, and of other economic plants under investigation by the Bureau; the formation of a collection of cultivated plants as the basis for an accurate knowledge of these plants; and the collection of data regarding the hardiness of the various species and varieties. The work covers the critical study and identification of all the material in the collection. Studies are being made in cooperation with the Horticulturist of the Bureau concerning the botanical origin of various cultivated plants with a view to assisting in the classification of cultivated varieties and in the determination of their relationships, especially in regard to their bearing on plant breed-

Wight, W. F.--Continued.

ing. In cooperation with the office of Foreign Plant Introduction, an index of economic plants desirable for introduction into the United States is in preparation. The object of this index is to provide means of making a more thorough exploration of the plant resources of various countries, by furnishing in advance information and descriptions of the economic plants, and a detailed statement of their geographic distribution. Expenses this year, about \$12,000, of which \$10,000 is for salaries and \$2,000 for traveling and other miscellaneous expenses. Mr. Wight is assisted by Messrs. C. F. Wheeler, P. L. Ricker, and H. C. Skeels.

WOOD, ANNA K. Assistant in laboratory studies of diseases of small fruits. See Shear, C. L.

WOOSLEY, H. C. Special agent in Kentucky and Tennessee tobacco investigations. See Mathewson and Shanel.

YOUNG, R. A. Assistant, Foreign Plant Introduction. See Fairchild.

YOUNG, T. B. Assistant in South Carolina drug plant experimental tests. See True.

YOUNGBLOOD, B. Special agent, Farm Management Investigations. In charge of work in District No. 4, embracing Texas and Oklahoma. (See Brodie.) The work in this district is essentially similar to that in the other farm management districts, and is conducted with special reference to the boll weevil problem. An agricultural reconnoissance of that portion of Oklahoma which was formerly the Indian Territory is being made, in order

Youngblood, B.--Continued.

to obtain information that will aid in the work and also in answering the numerous inquiries received. Expenses this year in this district, about \$4,500, of which \$2,300 is for salaries and \$2,200 for traveling and other miscellaneous expenses.

ZOCK, L. L. Assistant, Corn Investigations.
See Hartley.

S U B J E C T I N D E X

	<u>Name</u>	<u>Page</u>
Accounts, farm, study.....	Peck.....	74
Adulterants in seeds, detection	Brown, E..	26
Agricultural explorations, ex- tension, etc. See Explora- tions, Extension, etc.		
Alcohol, denatured, production	True.....	97
Alfalfa:		
Diseases, study.....	Townsend..	92
Explorations for.....	Hansen....	49
Hybridization.....	Cliver....	71
Introduction and extension	Westgate..	101
Life history, study.....	Brand.....	23
Use in the South, study...	Crosby....	37
See also Legumes.		
Algal pollutions of farm water supplies, eradication.....	Kellerman.	59
Alkali-resistant crops.....	Kearney...	58
Alkali-resistant sugar beets..	Townsend..	92
Almonds, dry-land, study.....	Mason.....	65
Animals, plants poisonous to..	(Alsberg...	17
	(Marsh.....	64
Anona introductions.....	Fairchild.	42
Apples:		
Diseases, study.....	(Scott.....	83
	(Waite.....	98
Districts, adaptability to	Gould.....	46
Explorations in China.....	Meyer.....	68
Export marketing.....	Taylor....	91
Storage experiments.....	Powell....	76
Arabian alfalfa, introduction.	Westgate..	101
Arboriculture, dry-land.....	Mason.....	65
Arid regions, crops for. See		
<u>Drought; Dry land.</u>		

	<u>Name</u>	<u>Page</u>
Arlington Experimental Farm...	Corbett...	34
Artichokes, introduction.....	Fairchild.	42
Asparagus, breeding for rust resistance.....	Shamel....	84
Asparagus, hybridization.....	Oliver....	71
Avocado introductions.....	Fairchild.	42
Avocado investigations.....	Cook.....	33
Bacterial diseases of crops...	Smith, E. F.	88
Bacteriology, soil and water..	Kellerman.	59
Bamboo explorations in Japan..	Hills.....	52
Bamboo introductions.....	Fairchild.	42
Banana investigations.....	Cook.....	33
Bananas, propagation.....	Green, E. C.	47
Barley:		
Adaptation to arid regions	Jardine...	55
Investigations and intro- duction.....	Derr.....	38
Malting varieties, study..	Mann.....	63
Smuts, prevention.....	Johnson...	57
Standardization.....	Shanahan..	85
Bean diseases, study.....	Orton.....	72
Beans, improvement.....	Tracy, W. Sr.	96
Beans, velvet, tests.....	Tracy, S. M.	94
Beef cattle, forage for.....	Cotton....	36
Beef farms, farm practice on..	Dodge.....	39
Beet-sugar industry, progress.	Saylor....	82
Beets, sugar. See <u>Sugar</u> .		
Bermuda lilies, propagation...	Oliver....	71
Bionomic investigations of cot- ton, corn, tropical fruits, etc.....	Cook.....	33
Blueberries, domestication....	Coville...	36
Boll weevil sections, farm	(Crosby....	37
management investigations...	(Goodrich..	46
	(McNair....	63
See also <u>Cotton</u> .	(Youngblood	103
Bookkeeping, farm, study.....	Peck.....	74
Brome-grass, improvement, etc.	Oakley....	70

	<u>Name</u>	<u>Page</u>
Bulbs, propagation and distribution.....	Morrison..	69
Cabbage diseases, study.....	Orton.....	72
Cacao investigations.....	Cook.....	33
Cactus investigations.....	Griffiths..	48
Camas, poisonous action, study	Alsberg...	17
Camphor investigations.....	True.....	97
Canada peas, experiments.....	Piper.....	75
Canning, corn for.....	Hartley...	50
Canning on the farm.....	Gould.....	46
Carnations, experiments.....	Byrnes....	27
Carrot diseases, study.....	Orton.....	72
Cassava, production of dena- tured alcohol from.....	True.....	96
Cassava varieties, tests.....	Tracy, S.M.	94
Cattle, beef, forage for.....	Cotton....	36
Cattle, plants poisonous to...	(Alsberg...)	17
	(Marsh.....)	64
Celery improvement.....	Oliver....	71
Celery investigations.....	Corbett...	34
Cereals. See <u>Grain</u> .		
Charlock, eradication.....	Cates.....	29
Chayote introductions.....	Fairchild.	42
Chayote investigations.....	Cook.....	33
Cherries, Chinese, collection.	Meyer.....	68
Chestnut bark disease, study..	Metcalf...	67
Chrysanthemums, hybridization.	Oliver....	71
Cider making on the farm.....	Gould.....	46
Cigar-leaf tobacco experiments	Hinson....	52
See also <u>Tobacco</u> .		
Citrus fruits:		
Breeding and life history.	Swingle...	90
Diseases, study.....	Patterson.	73
Distribution of trees.....	Morrison..	69
Propagation experiments...	Green, E.C.	47
Transportation experiments	Powell....	76

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LIBRARY

1. The first part of the book is devoted to a general introduction to the subject of the history of the United States. It begins with a chapter on the early history of the country, from the first discovery of the continent to the establishment of the first colonies. This is followed by a chapter on the growth of the colonies, from the first settlement to the time of the American Revolution. The third chapter deals with the American Revolution itself, from the first battle to the signing of the Declaration of Independence. The fourth chapter discusses the early years of the new nation, from the signing of the Constitution to the end of the War of 1812. The fifth chapter covers the period from 1812 to 1848, including the War of 1812, the Monroe Doctrine, and the Mexican War. The sixth chapter deals with the period from 1848 to 1865, including the California Gold Rush, the Mexican War, and the Civil War. The seventh chapter covers the period from 1865 to 1898, including the Reconstruction era, the Spanish-American War, and the Philippine War. The eighth chapter deals with the period from 1898 to 1914, including the Spanish-American War, the Philippine War, and the Mexican Revolution. The ninth chapter covers the period from 1914 to 1945, including the Mexican Revolution, the Spanish Civil War, and the Second World War. The tenth chapter deals with the period from 1945 to the present, including the Korean War, the Vietnam War, and the current situation in the United States.

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	<u>Name</u>	<u>Page</u>
Clover:		
Diseases, study.....	Townsend..	92
Hybridization.....	Oliver....	71
Introduction and extension	Westgate..	101
Life history, study.....	Brand.....	23
Rotation with tobacco.....	Mathewson.	66
Use in the South, study...	Crosby....	37
Coccanut diseases, study.....	Smith, E.F.	88
Coffee culture, study.....	Cook.....	33
Copper, use in water purifica- tion.....	Kellerman.	59
Cork caks, introduction.....	Fairchild..	42
Corn:		
Acclimatization of tropi- cal varieties.....	Cook.....	33
Breeding and selection....	Hartley....	50
Breeding for drought re- sistance.....	Saunders...	81
Cultural methods, improve- ment.....	Knapp.....	30
Culture, Williamson meth- od, tests.....	Goodrich...	46
Rotation with tobacco.....	Mathewson.	66
Standardization.....	Shanahan..	85
Use in the South, study...	Crosby....	37
See also <u>Sweet corn</u> .		
Cotton:		
Acclimatization of tropi- cal varieties.....	Cook.....	33
Breeding and selection....	(Bain.....	18
	(Boykin....	22
	(Saunders..	81
	(Shamel....	84
	(Shoemaker.	85
Breeding for wilt resist- ance.....	Orton.....	72
Cultural methods, improve- ment.....	Knapp.....	60
Culture among Indians.....	Swingle...	90

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The second part is devoted to a detailed analysis of the results of the experiments. It is shown that the results are in good agreement with the theoretical predictions. The third part is devoted to a discussion of the results of the experiments. It is shown that the results are in good agreement with the theoretical predictions.

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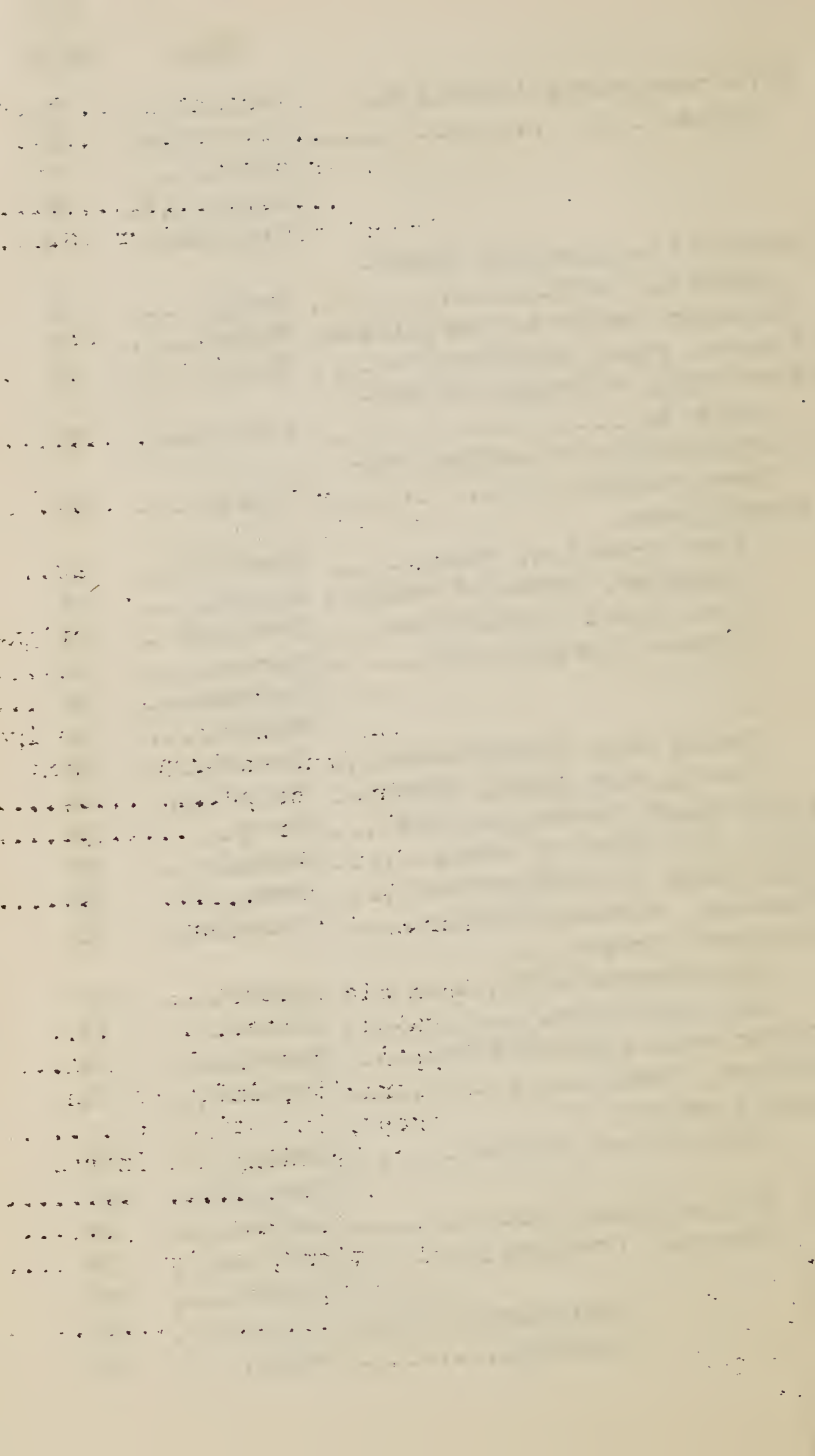
	<u>Name</u>	<u>Page</u>
Cotton--Continued:		
Diseases, study.....	Orten.....	72
Diversification and rota-	(Brodie....	25
tion of crops.....	(Scofield..	82
Egyptian cotton, breeding.	Kearney...	58
Farm management work.....	(Crosby....	37
	(Goodrich..	46
Forage crops for the cot-		
ton belt, testing.....	Tracy, S.H.	94
Seed distribution.....	Morrison..	69
Standardization, baling,	(Bennett...	20
and marketing, study....	(Cobb.....	32
Winter crops for cotton		
fields, testing.....	Boykin....	22
Cowpeas:		
Extension and testing.....	Piper.....	75
Hybridization.....	Oliver....	71
Rotation with cotton.....	Boykin....	22
Rotation with tobacco.....	Mathewson.	66
Seed production, study....	McNair....	63
Wilt-resistant varieties..	Orton.....	72
Cranberry diseases, study.....	Shear, C.L.	85
Crop rotation. See <u>Rotation</u> .		
Crop technology investigations	(Bennett...	20
	(Cobb.....	32
Cropping systems, study.....	(Brodie....	25
	(Peck.....	74
Crown-gall diseases, study....	Waite.....	98
Cucumber diseases, study.....	Orton.....	72
Dahlias, hybridization.....	Oliver....	71
Dairy farms, crop management..	(Billings..	21
	(Dodge.....	38
Daisy diseases, study.....	Townsend..	92
Date palm:		
Breeding for alkali and		
drought resistance.....	Kearney...	58
Chinese varieties, study..	Meyer.....	68
Establishment of culture..	Swingle...	90
Introduction of varieties.	Fairchild.	42

Demonstrations:

Corn breeding and culture.	Hartley...	50
Drug plants, peppers, etc.	True.....	97
Farmers' cooperative demonstration work.....	Knapp.....	60
Farm management.....	(Brodie.....	25
	(Goodrich..	46
Forage crops--alfalfa and clover.....	Westgate..	101
Forage crops for Gulf coast region.....	Tracy, S.M.	94
Indian reservations, cooperative farms.....	Swingle...	90
Pear-blight eradication...	Waite.....	98
Spraying orchards.....	Scott.....	83
Spraying small fruits.....	Shear, C.L.	85
Tobacco, crop rotation....	Mathewson.	66
Tobacco, vetch, asparagus, cereals, and cotton.....	Shamel....	83
Truck crops.....	Corbett...	34
Weed eradication.....	Cates.....	29
Denatured alcohol, production from waste products of farm.	True.....	97
Diseases of plants:		
Bacterial and fungous diseases.....	(Patterson.	73
	(Smith, E.F.	88
Cereal rusts and smuts....	Johnson...	57
Cotton and cowpea diseases	Orton.....	72
Forest trees and woods, ornamental trees, shrubs, etc.....	(Hedgcock..	51
	(Metcalf...	67
	(Spaulding.	88
Fruits and fruit trees....	(Scott.....	83
	(Shear, C.L.	85
	(Waite.....	98
Rice diseases.....	Chambliss.	30
Sugar beet diseases.....	Townsend..	92
Tobacco diseases.....	Shamel....	84
Truck crop diseases.....	Orton.....	72
Disease-resistant alfalfa and clover, hybridization.....	Cliver....	71

	<u>Name</u>	<u>Page</u>
Disease-resistant hops, breed- ing.....	Stockberger	89
Disease-resistant oats, breed- ing.....	Warburton.	100
Diversification of crops.....	(Crosby....	37
	(Knapp.....	60
See also <u>Rotation</u> .	(McNair....	63
Drought-resistant crops:		
Alfalfa and clover.....	(Brand.....	23
	(Westgate..	101
Corn and cotton.....	(Cook.....	33
	(Saunders..	81
Sugar beets.....	Townsend..	92
See also <u>Dry land</u> .		
Drug plant investigations.....	True.....	97
Dry land agriculture:		
Arboricultural investiga- tions.....	Mason.....	65
Cereal crops.....	Jardine...	55
Experiments and investiga- tions on Great Plains...	Chilcott..	31
Fruit crops.....	Gould.....	46
Machinery.....	Cobb.....	32
Plant breeding.....	Kearney...	58
Sorghums.....	Ball.....	18
Durum wheat investigations....	Carleton..	28
Economic collections of culti- vated plants.....	Wight.....	102
Egyptian cotton, breeding.....	Kearney...	58
Electricity, influence on	(Briggs....	24
crops, investigation.....	(Swingle...	90
Emmer, breeding and introduc- tion.....	(Carleton..	28
	(Jardine...	55
Equipment, farm, study.....	Ellis.....	41
Explorations, agricultural....	Fairchild.	42
Extension, agricultural, west- ern.....	Scofield..	82

	<u>Name</u>	<u>Page</u>
Farm management investiga-	(Brodie....	25
tions.....	(Griffiths..	48
	(Peck.....	74
	(Smith, C.B..	87
	(Spillman..	89
Farmers' cooperative demon-		
stration work.....	Knapp.....	60
Feldspar, value as fertilizer.	Shamel....	84
Fences, farm, construction....	Ellis.....	41
Fertility, relation of bac-		
teria to.....	Kellerman..	59
Fertilization in cotton cul-		
ture, tests.....	Boykin....	22
Fertilizers:		
Farm practice, study.....	Beavers...	19
Feldspar, tests of value..	Shamel....	84
Sugar beet fertilizers....	Townsend..	92
Tobacco fertilizers.....	(Garner....	45
	(Mathewson..	66
	(Shamel....	84
Truck crop fertilizers....	Corbett...	34
Use in the South, study...	Goodrich..	46
Fiber plant investigations....	Dewey.....	38
Figs, life history study.....	Swingle...	90
Flax fiber investigations.....	Dewoy.....	38
Flaxseed, standardization....	Shanahan..	85
Florists' crops:		
Experiments with.....	Byrnes....	27
Hybridization.....	Oliver....	71
Flower seed distribution.....	Morrison..	69
Flowers, tests.....	Corbett...	34
Forage crops:		
Alfalfa and clover.....	(Brand.....	23
	(Westgate..	101
Explorations for.....	Hansen....	49
Grasses, breeding.....	(Kearney...	58
	(Oliver....	71
systematic study.	Hitchcock.	53
testing.....	Oakley....	70



Forage crops--Continued:

Introduction, testing, and extension.....	Piper.....	75
Tests at various points...	(Green, E. C.	47
	(Hunter....	54
	(Tracy, S. H.	94
	(Tracy, W. Jr.	95

Use in feeding cattle and sheep, study.....	Cotton....	36
--	------------	----

Use on the Great Plains...	Chilcott..	31
----------------------------	------------	----

Forcing tomatoes.....	Oliver....	71
-----------------------	------------	----

Foreign plant introduction...	Fairchild.	42
-------------------------------	------------	----

See also Introduction.

Forest pathology investiga- tions.....	(Hedgcock..	51
	(Metcalf...	67
	(Spaulding.	88

Forests, National, grazing experiments.....	Coville...	36
--	------------	----

Forests, National, poisonous plant investigations.....	Marsh.....	64
---	------------	----

Fruits:

Collection of specimens..	Brackett..	23
Diseases, study and con- trol.....	(Scott.....	83
	(Shear, C. L.	85
	(Waite.....	98

Districts, adaptability of varieties to.....	Gould.....	46
---	------------	----

Dry land fruits.....	Mason.....	65
----------------------	------------	----

Explorations for.....	(Hansen....	49
	(Meyer.....	68

Farm practice.....	Dodge.....	39
--------------------	------------	----

Marketing, investigations	Taylor....	91
---------------------------	------------	----

Propagation and testing..	(Green, E. C.	47
	(Tracy, W. Jr.	95

Transportation and stor- age investigations.....	Powell....	76
---	------------	----

Tropical fruits, study	(Cook.....	33
------------------------	------------	----

and improvement.....	(Oliver....	71
----------------------	-------------	----

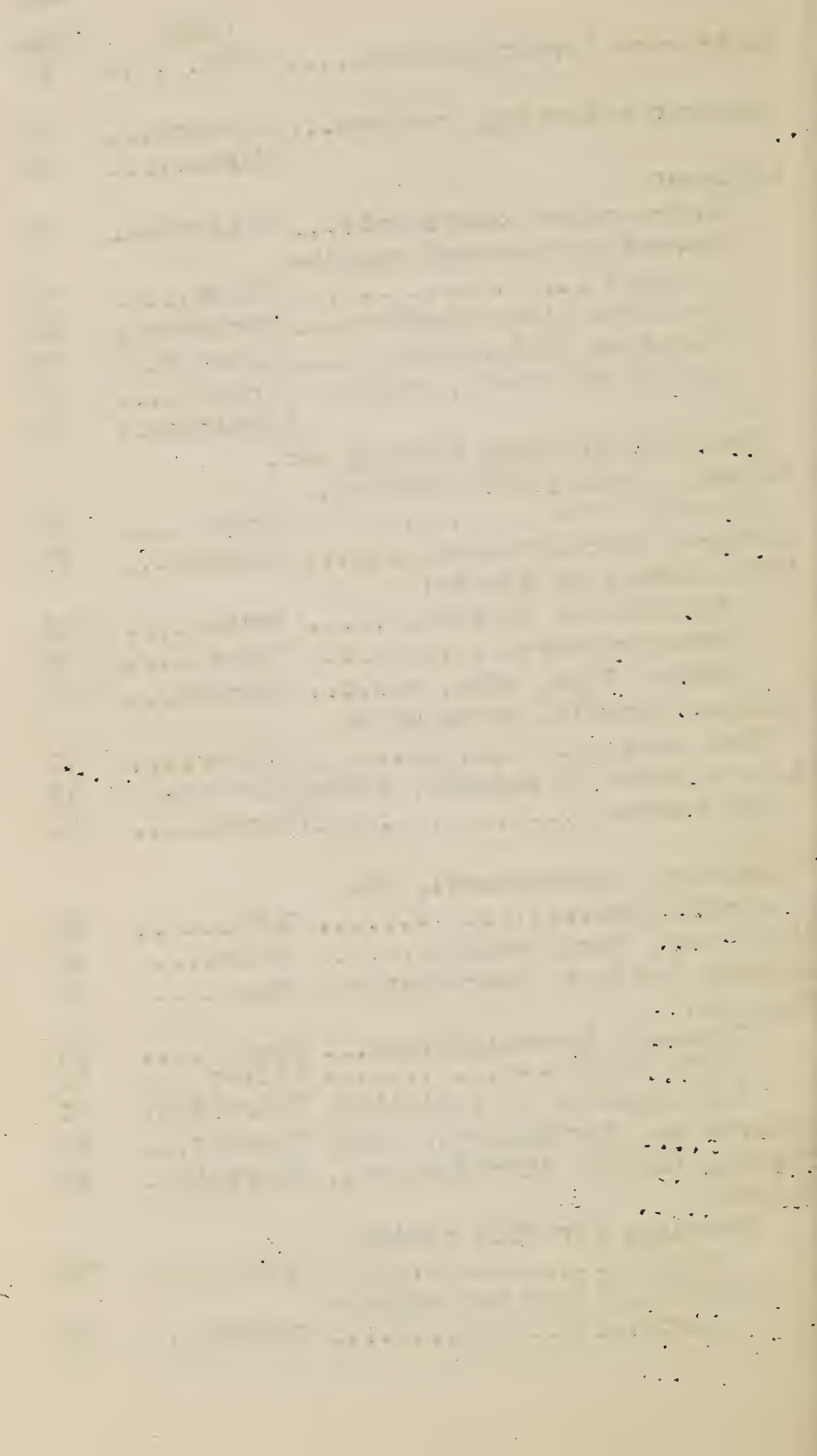
See also Dates; Grapes; etc.

Fungous diseases. See Diseases.

	<u>Name</u>	<u>Page</u>
Gardens and grounds.....	Byrnes....	27
Gases, effect on trees, study.	Metcalf...	67
Grains:		
Barley investigations.....	Derr.....	38
Biological studies.....	Cobb.....	32
Diseases, study.....	Johnson...	57
Dry land cereals, testing.	Jardine...	55
Experiments in Texas.....	Ross.....	78
Farm practice, study.....	Miller....	68
Introduction of new grains	Fairchild.	42
Investigations and experi- ments.....	Carleton..	28
Oat investigations.....	Warburton.	100
Rice investigations.....	Chambliss.	30
Sorghum investigations....	Ball.....	18
Standardization of grain..	Shanahan..	85
See also <u>Corn</u> ; <u>Wheat</u> ; etc.		
Grapes:		
Chinese varieties, study..	Meyer.....	68
Diseases, study.....	Shear, C.L.	85
Distribution of vines.....	Morrison..	69
Introduction of varieties.	Fairchild.	42
Investigations and experi- ments.....	Husmann...	54
Propagation and testing...	Green, E.C.	47
Grasses:		
Breeding for alkali and drought resistance.....	Kearney...	58
Dry-land varieties, tests.	Chilcott..	31
Farm practice, study.....	Hunter....	54
Hybridization.....	Oliver....	71
Introduction, testing, and extension.....	Oakley....	70
Rotation with tobacco.....	Mathewson.	66
Seed distribution.....	Morrison..	69
Systematic study.....	Hitchcock.	53
Tests on Gulf coast.....	Tracy, S.M.	94
Grazing areas on National For- ests, improvement.....	Coville...	36

	Name	Page
Greenhouse crops, influence of moisture, etc., study.....	Corbett...	34
Greenhouse plants, hybridization.....	Oliver....	71
Greenhouses, inspection of plants.....	Patterson.	73
Greenhouses, maintenance.....	Byrnes....	27
Hay and haymaking, farm practice, study.....	(Goodrich..	46
	(McClure...	62
	(McNair....	63
Hemp investigations.....	Dewey.....	38
Henequen fiber introduction...	Dewey.....	38
Hog production, farm practice.	(Cotton....	36
	(Dodge....	39
	(Hunter....	54
Hops, American, study.....	Stockberger	89
Hops, European, introduction..	Fairchild.	42
Horseradish culture, study....	Corbett...	34
Horses, loco disease, control.	Marsh.....	64
Humus conservation, study.....	Chilcott..	31
Hyacinth bulbs, propagation...	Morrison..	69
Implements, farm, study.....	Ellis.....	41
Indian reservations, cooperative demonstration farms....	Swingle...	90
Inoculation, soil, experiments	Kellerman.	59
Introduction of seeds and plants:		
Alfalfa.....	Westgate..	101
Barleys.....	(Dorr.....	38
	(Mann.....	63
Foreign Seed and Plant Introduction.....	Fairchild.	42
Oats.....	Warburton.	100
Plant Introduction Garden.	Tracy, W. Jr.	95
Plant introduction index..	Wight.....	102
Johnson grass, eradication...	Cates.....	29
Jujube, Chinese, introduction.	Swingle...	90
Jute fiber investigations.....	Dewey.....	38

	<u>Name</u>	<u>Page</u>
Kaffir corn investigations.....	Ball.....	18
Larkspur poisoning, control...	(Alsberg...	17
	(Marsh.....	64
Legumes:		
Inoculation experiments...	Kellerman.	59
Investigations and experi-		
ments.....	Piper.....	75
Rotation with cereals.....	Carleton..	28
Tests on Gulf coast.....	Tracy, S.M.	94
Use in the South, study...	(Crosby....	37
	(Goodrich..	45
See also <u>Alfalfa</u> ; <u>Forage</u> ; etc.		
Lemons, growing and handling,		
investigation.....	True.....	97
Lettuce, hybridization.....	Oliver....	71
Life history of plants:		
Alfalfa and clover.....	Brand.....	23
Arboriculture.....	Mason.....	65
Dates, figs, nuts, etc....	Swingle...	90
Lilies, Bermuda, propagation		
from seed.....	Oliver....	71
Loco disease of animals, study	(Alsberg...	17
and control.....	(Marsh.....	64
Machinery, agricultural, in-		
vestigation.....	Cobb.....	32
Machinery, farm, study.....	Ellis.....	41
Malting barleys, introduction.	Mann.....	63
Mangoes:		
Bionomic investigations...	Cook.....	33
Improvement.....	Oliver....	71
Introduction of varieties.	Fairchild.	42
Manures and fertilizers, study	Beavers...	19
Matting plants, introduction..	Fairchild.	42
Melons:		
Breeding for wilt resist-		
ance.....	Orton.....	72
Investigations and experi-		
ments.....	Corbett...	34

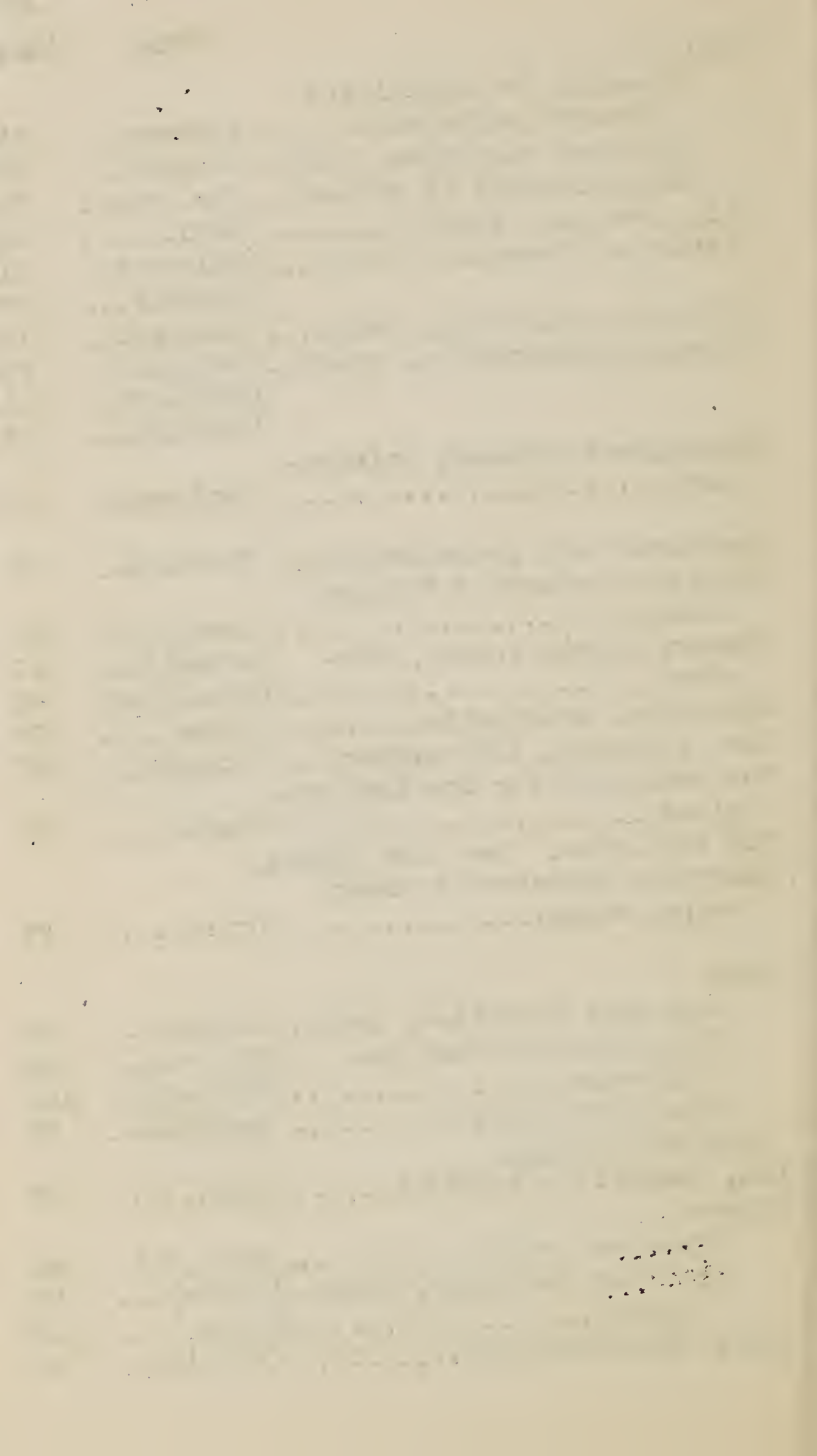


Millets:

Breeding for alkali and drought resistance.....	Kearney...	58
Dry-land varieties, tests.	Jardine...	55
Establishment of culture..	Carleton..	28
Milo, sorghum, tests.....	Ball.....	18
Mistletoe diseases of trees...	(Hodgcock..	51
	(Metcalf...	67
Mistletoe poisoning, study....	Alsberg...	17
Moisture conservation, study..	(Briggs....	24
	(Chilcott..	31
	(Scofield..	82
Mycological indexes, maintain- ance.....	Patterson.	73
Narcissus bulb propagation....	Morrison..	69
Nicotine content of tobacco, tests.....	Garner....	45
Nursery stock, forest, dis-	(Metcalf...	67
eases.....	(Spaulding.	88
Nut-grass, eradication.....	Cates.....	29
Nut, pistache, life history...	Swingle...	90
Nut varieties for dry-land re- gions.....	Mason.....	65
Nut varieties. See also <u>Pecans</u> .		
Nutrition diseases of truck crops, study.....	Orton.....	72

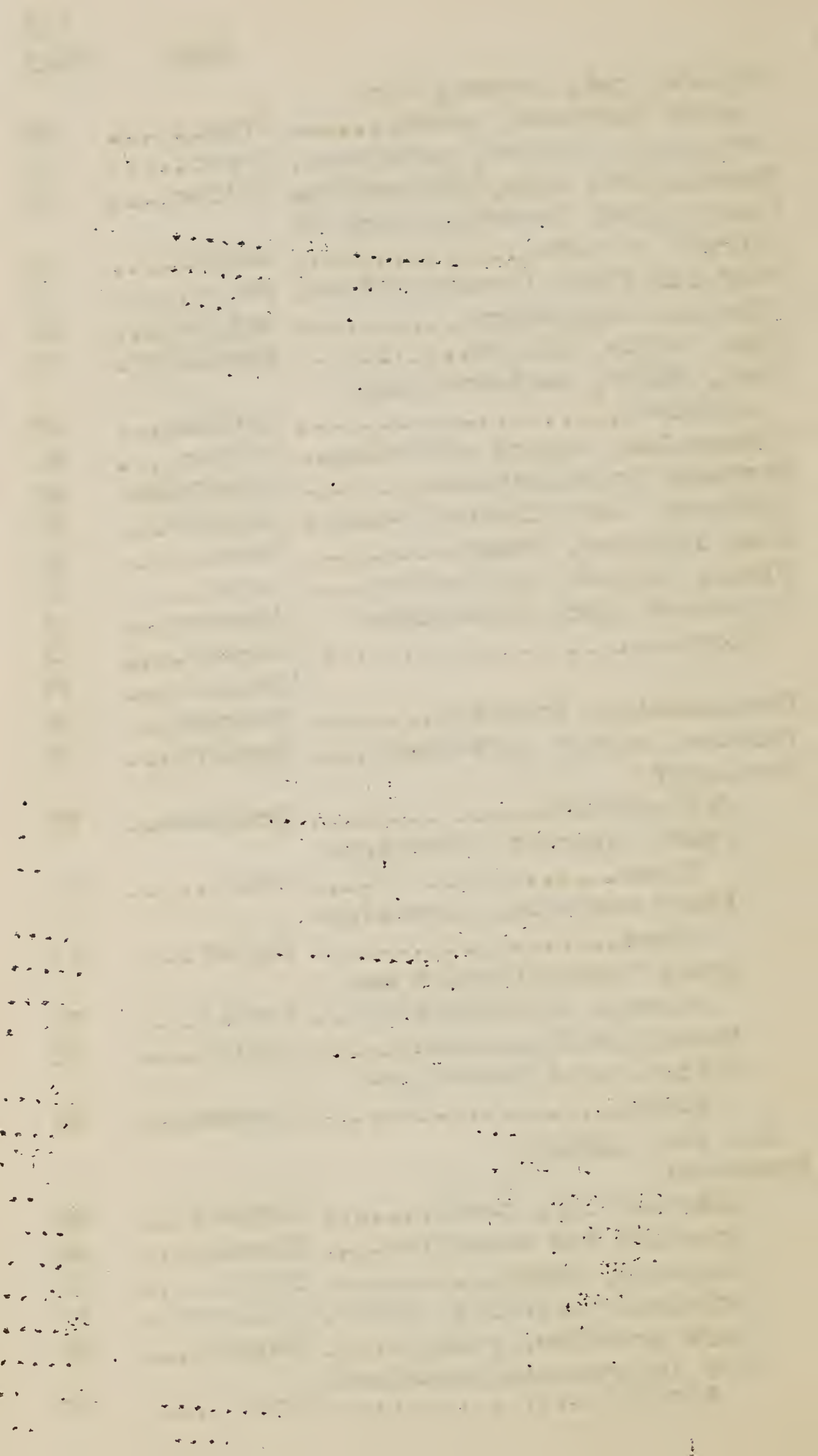
Oats:

Dry-land varieties, tests.	Jardine...	55
Investigations and im-	(Carleton..	28
provement.....	(Warburton.	100
Standardization.....	Shanahan..	85
See also <u>Grains</u> .		
Oil, camphor, production.....	True.....	97
Olives:		
Diseases, study.....	Smith, E.F.	88
Dry-land varieties, devel-	(Kearney...	58
opment.....	(Mason.....	65
Onion investigations.....	Corbett...	34



	<u>Name</u>	<u>Page</u>
Oranges:		
Breeding and life history		
study.....	Swingle...	90
Transportation and storage		
investigations.....	Powell....	76
Orchard diseases. See <u>Diseases</u> .		
Orchard grass, improvement....	Oakley....	70
Ornamental plants, diseases...	Patterson.	73
Ornamental trees, diseases...	Metcalf...	67
Ornamentals, Chinese, collec-		
tion.....	Meyer.....	68
Paper-making plants, tests....	Cobb.....	32
Para grass, tests.....	Tracy, S.M.	94
Pathology. See <u>Diseases</u> .		
Peaches:		
Diseases, study and con-	(Scott.....	83
trol.....	(Waite.....	98
Introduction of vario-	(Fairchild.	42
ties.....	(Meyer.....	68
Marketing, transportation,	(Powell....	76
and storage experiments,	(Taylor....	91
Wild varieties, study....	Mason.....	65
Pear-blight, eradication.....	Waite.....	98
Pears, Chinese, collection....	Meyer.....	68
Peas:		
Canada peas, tests.....	Piper.....	75
Diseases, study.....	Orton.....	72
Dry-land varieties, tests.	Chilcote..	31
Improvement by selection..	Tracy, W. Sr.	96
Rotation with tobacco.....	Hinson....	52
Use in the South, study...	Crosby....	37
Peanuts:		
Farm practice, study.....	Miller....	68
Tests and demonstrations..	Corbett...	34
Pecans:		
Diseases, study.....	Orton.....	72
Varietal adaptability,		
investigations.....	Taylor....	91

Peppers, red, growing for spice purposes, tests.....	True.....	97
Persimmon, Chinese, seedless..	Meyer.....	68
Phenological data, collection.	Miller....	68
Phenological investigations of fruit culture.....	Gould.....	46
Phormium fiber investigations.	Dewey.....	38
Physical laboratory.....	Briggs....	24
Pine, white, blight.....	Spaulding.	88
Pine, white, leaf-dropping disease.....	Metcalf...	67
Pineapples, export marketing..	Taylor....	91
Pistache introductions.....	Fairchild.	42
Pistache, life history study..	Swinglô...	90
Plum diseases, study.....	Scott.....	83
Plums, Chinese, collection....	Meyer.....	68
Poisonous plant investiga- tions.....	(Alsberg... (Marsh..... (True.....	17 64 97
Pomegranates, breeding.....	Kearney...	58
Pomelos, export marketing.....	Taylor....	91
Pomology:		
Collections.....	Brackett..	23
Fruit district investiga- tions.....	Gould.....	46
Fruit marketing investiga- tions.....	Taylor....	91
Fruit transportation and storage investigations..	Powell....	76
Pecan investigations.....	Taylor....	91
Viticultural investiga- tions.....	Husmann...	54
See also <u>Fruits</u> .		
Potatoes:		
Adaptability, tests.....	Corbett...	34
Breeding and selection....	Shamol....	84
Diseases, study.....	Ortén.....	72
Dry-land varieties, tests.	Chilcott...	31
Farm practice, study.....	Dodge.....	39
Use in producing denatured alcohol.....	True.....	97

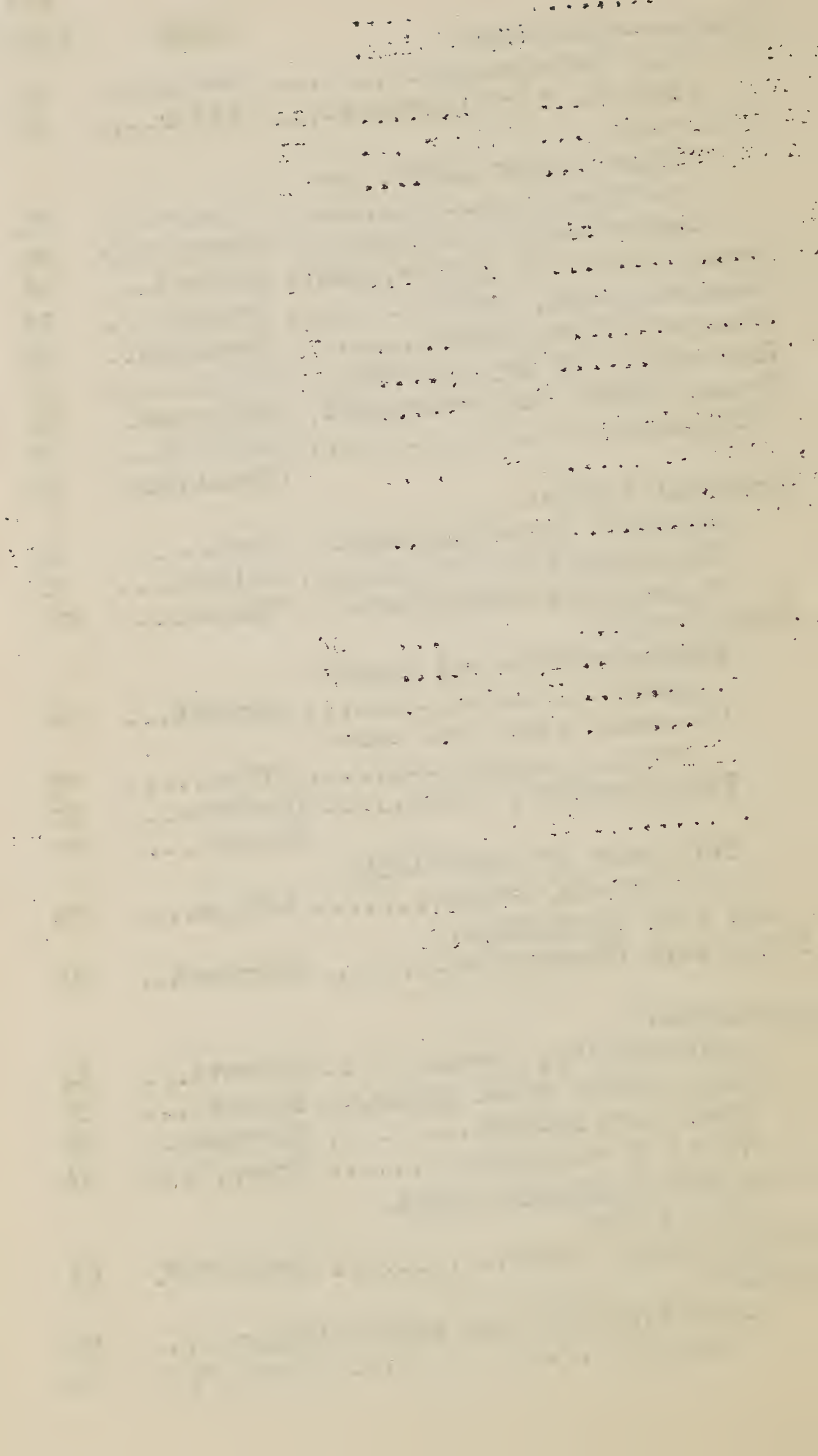


	<u>Name</u>	<u>Page</u>
Proso, or broom-corn millet, establishment of culture....	Carleton..	28
Quack-grass, eradication.....	Cates.....	29
Ramie fiber production, study.	Dewey.....	38
Range grazing areas on Nation- al Forests, improvement.....	Coville...	36
Range management investiga- tions and experiments.....	(Griffiths. (Spillman..	48 89
Records, farm, study.....	Peck.....	74
Redtop, improvement.....	Oakley....	70
Rice investigations.....	Chambliss.	30
Root crops, introduction.....	Fairchild.	42
Roses, hybridization.....	Oliver....	71
Rotation of crops:		
Cereal production.....	(Carleton..	28
	(Ross.....	78
Cotton culture.....	Scotfield..	82
Demonstrations in tobacco culture, etc.....	(Mathewson. (Shamel....	66 84
Dry-land agriculture.....	Chilcott..	31
Farm practice.....	Hunter....	54
See also <u>Diversification</u> .		
Rotundifolia grape industry, development.....	Husmann...	54
Rubber and rubber substitutes, bionomic investigations.....	Cook.....	33
Rust-resistant asparagus, breeding.....	(Oliver.... (Shamel....	71 84
Rusts of cereals, prevention..	Johnson...	57
Rye, standardization.....	Shanahan..	85
School-garden distribution of seeds.....	(Corbett... (Morrison..	34 69
Seed and plant introduction...	Fairchild.	42
See also <u>Introduction</u> .		
Seed distribution:		
Regular Congressional dis- tribution.....	(Morrison.. (Tracy, J...	69 94

	Name	Page
Seed distribution--Continued:		
Special distribution of	(Morrison..	69
cotton seed, tobacco	(Shamel....	84
seed, etc.....	(Shoemaker..	86
Seed testing laboratories.....	Brown, E..	26
Sheep, forage, study.....	Cotton....	36
Sheep, loco disease, control..	(Alsberg...	17
	(Marsh.....	64
Shrubs, diseases, study.....	Hietcalf...	67
Siloing sugar beets.....	Townsend..	92
Sisal fiber introduction.....	Dewey.....	38
Smuts of cereals, control.....	Johnson...	57
Soil bacteriology investiga-		
tions.....	Kellerman..	59
Soil fertility. See <u>Fertility</u> ;		
<u>Fertilizers</u> .		
Soil improvement, forage crops	Piper.....	75
Soil inoculation experiments..	Kellerman..	59
Sorghums:		
Breeding for alkali and		
drought resistance.....	Kearney...	58
Dry-land varieties, tests.	Jardine...	55
Forage sorghums, tests....	Piper.....	75
Grain sorghums, tests.....	Ball.....	18
Smuts, study and control..	Johnson...	57
Use in producing denatured		
alcohol.....	True.....	97
Soy bean investigations.....	Piper.....	75
Spelt, drought resistance,		
tests.....	Jardine...	55
Spinach diseases, study.....	Townsend..	92
Spraying demonstrations in	(Scott.....	83
control of fruit diseases...	(Shear, C.L.	85
Standardization of cotton.....	(Bennett...	20
	(Cobb.....	32
Standardization of grain.....	Shanahan..	85
Storage, fruit, investigations	Powell....	76
Strawberry plant distribution.	Morrison..	69

	<u>Name</u>	<u>Page</u>
Sugar beets:		
Breeding for alkali and drought resistance.....	Koarnoy...	58
Investigations and experiments.....	Townsend..	92
Seed production, domestic, development.....	Tracy, J..	94
Sugar production, progress, investigation.....	Saylor....	82
Sugar-beet pulp as food for cattle, study.....	Cotton....	36
Sugar cane diseases, study....	Smith, E.F.	88
Sulphur, effect on trees, study	Metcalf...	67
Sweet corn:		
Improvement by selection..	Tracy, W. Sr.	96
Investigations and experiments.....	Hartley....	50
Sweet potatoes:		
Adaptability, tests.....	Corbett...	34
Production of denatured alcohol, experiments....	True.....	97
Taxonomic and range investigations:		
Development of grazing areas on National Forests	Coville...	36
Economic collections of cultivated plants.....	Wight.....	102
Economic plants, notes....	Safford...	80
Systematic study of grasses.....	Hitchcock.	53
Tea culture investigations...	Time.....	97
Tillage methods, farm practice	Cates.....	29
Timothy, improvement.....	Oakley....	70
Tobacco:		
Cigar tobacco investigations.....	(Garner....	45
tions.....	(Shamel....	84
Export and manufacturing tobacco investigations..	Mathewson.	66
Root-rot, prevention.....	Briggs....	24

	Name	Page
Tobacco--Continued:		
Seed distribution.....	Morrison..	69
Study of farm practice....	Miller....	68
Tomatoes:		
Culture under glass, ex-		
periments.....	Oliver....	71
Improvement by selection..	Tracy, W. Sr.	96
Transpiration of plants, study.	Corbett...	34
Transportation, fruit.....	Powell....	76
Transportation, grain.....	Shanahan..	85
Tree crops for dry regions....	Mason.....	65
Trees, forest and ornamental,	(Hedgcock..	51
diseases.....	(Metcalf...	67
	(Spaulding.	88
Tropical fruits:		
Bionomic investigations...	Cook.....	33
Improvement by breeding...	Oliver....	71
Propagation experiments...	Wester....	101
Truck crops:		
Demonstrations and experi-		
ments.....	Corbett...	34
Diseases, study and con-		
trol.....	Orton.....	72
Farm practice, study.....	(Crosby....	37
	(Dodge.....	39
Influence of electricity		
on growth, study.....	Briggs....	24
See also <u>Vegetables</u> .		
Tulip bulb propagation.....	Morrison..	69
Vegetables:		
Adaptability, tests.....	Corbett...	34
Experiments under glass...	Byrnes....	27
Seed distribution.....	Morrison..	69
Tests of varieties.....	Tracy, W. Sr.	96
See also <u>Tomatoes</u> ; <u>Truck</u>		
<u>Crops</u> ; Etc.		
Velvet beans, tests.....	Tracy, S.M.	94
Vetches:		
Investigations and experi-	(Piper....	75
ments.....	(Tracy, S.M.	94



Vetches--Continued:

Rotation with cotton.....	Boykin....	22
---------------------------	------------	----

Rotation with tobacco.....	Shamel....	84
----------------------------	------------	----

Use in the South, study...	Crosby....	37
----------------------------	------------	----

Vinifera grape industry, development.....	Husmann...	54
---	------------	----

Viticultural investigations...	Husmann...	54
--------------------------------	------------	----

Water-cress investigations...	Corbett...	34
-------------------------------	------------	----

Water purification investigations.....	Kellerman.	59
--	------------	----

Watermelons, breeding for wilt resistance.....	Orton.....	72
--	------------	----

Weeds, eradication experiments	Cates.....	29
--------------------------------	------------	----

Weevil, boll, work against.		
-----------------------------	--	--

See <u>Cotton</u> .		
---------------------	--	--

Western agricultural extension	Scofield..	82
--------------------------------	------------	----

Wheat:

Dry-land varieties, tests.	Jardine...	55
----------------------------	------------	----

Durum wheat, establishment	Carleton..	28
----------------------------	------------	----

Farm practice, study.....	Hunter....	54
---------------------------	------------	----

Milling and baking tests..	Fitz.....	44
----------------------------	-----------	----

Rotation with tobacco.....	Mathewson.	66
----------------------------	------------	----

Smuts and bunt, prevention	Johnson...	57
----------------------------	------------	----

Standardization.....	Shanahan..	85
----------------------	------------	----

Wheat-grass, western, tests...	Oakley....	70
--------------------------------	------------	----

Wild onion, eradication tests.	Cates.....	29
--------------------------------	------------	----

Wild plants for dry regions...	Mason.....	65
--------------------------------	------------	----

Wilt-resistant cotton, cow-peas, and melons, breeding..	Orton.....	72
---	------------	----

Winter grains, improvement...	Carleton..	28
-------------------------------	------------	----

Winter legumes, tests.....	Piper.....	75
----------------------------	------------	----

Woods, diseases, study and	(Hedgcock..	51
----------------------------	-------------	----

control.....	(Metcalf...	67
--------------	-------------	----

	(Spaulding.	88
--	-------------	----

Yautia introduction.....	Fairchild.	42
--------------------------	------------	----

Zapupe fiber introduction.....	Dewey.....	38
--------------------------------	------------	----

Zygadenus (camas) poisoning...	Alsberg...	17
--------------------------------	------------	----

L O C A L I T Y I N D E X

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
 A L A B A M A:		
*Alfalfa and clover testing. Westgate..		101
Generally through State		
Bamboo introductions.....	(Fairchild.	42
At various points.	(Hills.....	52
Cotton and truck diseases..	Orton.....	72
Columbia, Houston Co.		
Notasulga, Macon Co.		
Farm management work.....	Crosby....	37
Huntsville, Madison Co.		
Talladega, Talladega Co.		
Uninntown, Perry Co.		
Generally through State		
Farmers' cooperative demon-		
stration work.....	Knapp.....	60
Generally through State		
Tobacco experiments.....	Hinson....	52
Marion, Perry Co.		
Truck crop investigations..	Corbett...	34
Truck diseases (see above).	Orton.....	72
*Vegetable testing.....	Tracy, W. Sr.	96
Auburn, Lee Co.		
 A R I Z O N A:		
Alfalfa and clover testing.	Brand.....	23
Sacaton, Maricopa Co.		
Naco, Cochise Co.; Etc.		
Arboricultural experiments.	Mason.....	65
Sacaton, Maricopa Co.		
Breeding alkali and drought		
resistant crops.....	Kearney...	58
Sacaton, Maricopa Co.		
Yuma, Yuma Co.		
*The asterisk indicates cooperation with the		
Agricultural Experiment Stations		(125)

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
A R I Z O N A---Continued:		
*Cactus experiments.....	Griffiths.	48
Tucson, Pima Co.		
Corn breeding and testing..	(Cook.....	33
Yuma, Yuma Co.	(Hartley...	50
*Date garden.....	Swingle...	90
Tempe, Maricopa Co.		
Economic plants, study.....	Safford...	80
Indian demonstration farm..	Swingle...	90
Sacaton, Maricopa Co.		
*Range management work.....	Griffiths.	48
Santa Rita Natl. Forest.		
Western agricultural exten-		
sion, experiment farm...	Scofield..	82
Yuma, Yuma Co.		
A R K A N S A S:		
Cotton breeding work.....	Bain.....	18
Clarendon, Monroe Co.		
Farm management work.....	McNair....	63
Generally through State.		
Farmers' cooperative demon-		
stration work.....	(Evans, J.A.	41
Generally through State.	(Knapp.....	60
Fruit district work.....	Gould.....	46
Generally through State.		
Orchard diseases, control..	Waite.....	98
Farmington and Fayette-		
ville, Washington Co.		
Orchard spraying work.....	Scott.....	83
Bentonville and Pea		
Ridge, Benton Co.		
*Rice investigations.....	Chambliss.	30
Lonoke, Lonoke Co.		
C A L I F O R N I A:		
Alfalfa and clover testing..	(Brand.....	23
Chico, Butte Co.	(Westgate..	101
Indio, Riverside Co.		
Generally through State.		

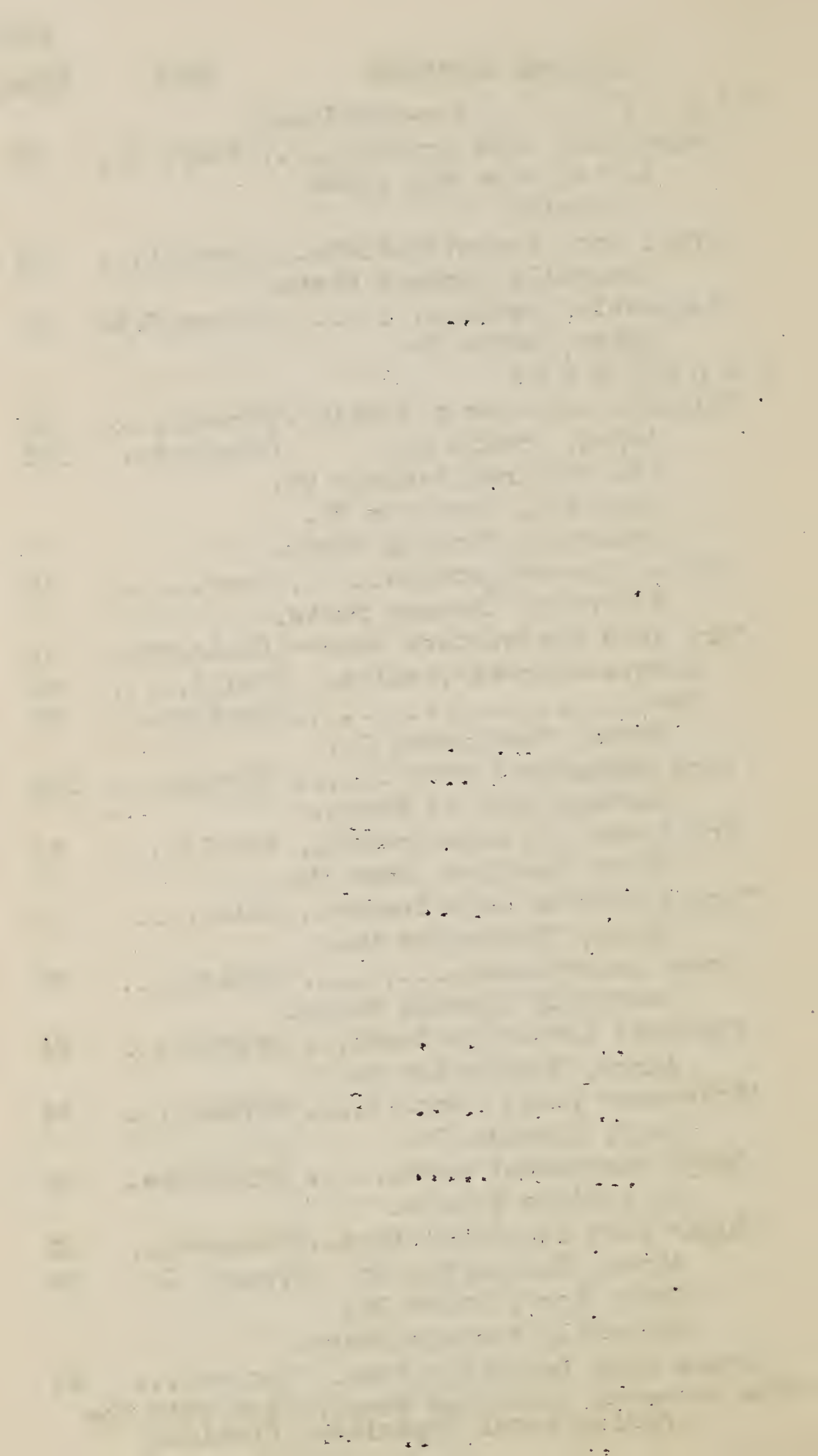
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Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
C A L I F O R N I A---Continued:		
Arboricultural experiments.	Mason.....	65
Indio and Mecca, River- side Co.		
Bamboo experiments.....	Hills.....	52
Bakersfield, Kern Co.		
Cactus experiments.....	Griffiths.	48
Chico, Butte Co.		
Riverside, Riverside Co.		
Clover (see Alfalfa).		
Corn breeding and testing..	Hartley...	50
Chico, Butte Co.		
Cotton and corn acclimatiz- ation.....	Cook.....	33
Chico, Butte Co.		
Los Angeles, Los An- geles Co.		
Date introduction and cul- (Fairchild.		42
tivation.....(Swingle...		90
Indio and Mecca, River- side Co.		
Economic plants, notes.....	Safford...	80
Farm management work.....	Hunter....	54
Northern part of State.		
Fiber plant investigations.	Dewey.....	38
Los Angeles, Los Ang.Co.		
San Diego, San Diego Co.		
Forage crop testing.....	Piper.....	75
Chico, Butte Co.		
Forest pathology investiga- tions.....	Spaulding.	88
National Forests, Etc.		
*Fruit diseases, control....	Waite.....	98
Auburn, Placer Co.		
Sacramento, Sacramento Co.		
Generally through State.		
Fruit storage experiments..	Powell....	76
Pasadena, Los Angeles Co.		
Redlands, San Bernard- inc Co.		
Watsonville, Santa Cruz Co.		

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
C A L I F O R N I A---Continued:		
Fruit transportation work..	Powell....	76
Los Angeles and Pasadena,		
Los Angeles Co.		
Riverside, Riverside Co.		
*Grain experiments.....	Carleton..	28
Ceres, Stanislaus Co.		
Davis, Yolo Co.		
*Grape experiments.....	Husmann...	54
Chico, Butte Co.		
Fresno, Fresno Co.		
Oakville, Napa Co.		
Stockton, San Joaquin Co.		
Grape introductions.....	Fairchild.	42
Chico and other points.		
Hop experiments.....	Stockberger	89
Cosumne and Perkins,		
Sacramento Co.		
Pleasanton, Alameda Co.		
Wheatland, Yuba Co.		
Hybridization of plants....	Oliver....	71
Longbeach, Los Angeles Co.		
Loomis, Placer Co.		
Riverside, Riverside Co.		
Santa Ana, Orange Co.		
Ukiah, Mendocino Co.		
Lemons, drug plants, etc...	True.....	97
Riverside and elsewhere.		
Matting plant introductions	Fairchild.	42
Chico and other points.		
*Plant introduction garden..	(Fairchild.	42
Chico, Butte Co.	(Tracy, W. Jr.	95
Rangel management work.....	Griffiths.	48
Generally through State.		
Rice investigations.....	Chambliss.	30
At various points.		
Sugar beet investigations..	Townsend..	92
Compton, Los Angeles Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
C A L I F O R N I A---Continued:		
Sugar beet seed growing.....	Tracy, J..	94
Los angeles and other points.		
Truck crop investigations...	Corbett...	34
Generally through State.		
Vegetable testing.....	Tracy, W. Sr.	96
Chico, Butte Co.		
C O L O R A D O:		
*Alfalfa and clover testing.(	Brand.....	23
Aspen, Pitkin Co.	(Westgate..	101
Ft. Collins, Larimer Co.		
Gunnison, Gunnison Co.		
Generally through State.		
Barley investigations.....	Derr.....	38
Generally through State.		
*Dry land agriculture exper-	(Chilcott..	31
iments--cereals, fruits,	(Gould.....	46
etc.....	(Jardine...	55
Akron, Washington Co.		
Farm management work.....	Warren....	100
Eastern part of State.		
Fruit storage experiments..	Powell....	76
Grand Junction, Mesa Co.		
*Grain sorghum experiments..	Ball.....	18
Akron, Washington Co.		
Grass experiments.....	Oakley....	70
Generally through State.		
Physical investigations....	Briggs....	24
Akron, Washington Co.		
*Poisonous plant work.....	Marsh.....	64
Hugo, Lincoln Co.		
Range management work.....	Griffiths.	48
At various points.		
*Sugar beet investigations..	(Townsend..	92
Akron, Washington Co.	(Tracy, J..	94
Rocky Ford, Otero Co.		
Generally through State.		
Truck crop investigations..	Corbett...	34
*The asterisk indicates cooperation with the Agricultural Experiment Stations		



<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
C O N N E C T I C U T:		
*Corn breeding and testing. Hartley... Generally through State.		50
Fruit diseases, control... Waite..... Seymour, New Haven Co.		98
Fruit marketing work..... Taylor.... South Glastonbury, Hartford Co.		91
*Tobacco and other plant (Garner.... breeding and testing....(Shamel.... Granby, Hartford, Hockanum, Suffield, and Tarriffville, Hartford Co.		45 84
Tobacco root-rot, control. Briggs.... Suffield, Hartford Co.		24
Vegetable testing..... Tracy, W. Sr. Hartford and Hockanum.		96
See also <u>New England States.</u>		
D E L A W A R E:		
*Corn breeding and testing. Hartley... Generally through State.		50
Farm management work..... Miller.... Generally through State.		68
Fruit district work..... Gould..... Generally through State.		46
Fruit marketing work..... Taylor.... Wyoming, Kent Co.		91
F L O R I D A:		
Alfalfa and clover testing Brand..... Gainesville, Alachua Co.		23
Cactus experiments..... Griffiths. Gainesville, Alachua Co.		48
Citrus fruits, breeding... Swingle... Glen St. Mary, Baker Co.		90
*Corn breeding and testing. Hartley... Generally through State.		50
*Diseases of truck crops, etc., control..... Orton..... Gainesville and Glen St. Mary.		72
*The asterisk indicates cooperation with the Agricultural Experiment Stations		

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
F L O R I D A---Continued:		
Drug plants, camphor, etc., testing.....	True.....	97
Orange City, Volusia Co.		
Farm management work.....	Goodrich..	46
Generally through State.		
Farmers' cooperative demon- stration work.....	Knapp.....	60
Generally through State.		
Forage crop testing.....	Tracy, S.M.	94
Miami, Dade Co.		
Fruit marketing work.....	Taylor....	91
Orange Heights, Alachua Co.		
Fruit transportation work..	Powell....	76
Arcadia, De Soto Co.		
Wildwood, Sumter Co.		
Orlando, Orange Co.		
Grape investigations.....	Husmann...	54
New Smyrna, Volusia Co.		
Matting plant testing.....	Fairchild.	42
At various points.		
Subtropical garden.....	Wester....	101
Miami, Dade Co.		
*Tobacco breeding and tests.	(Garner....	45
Hinson, Gadsden Co.	(Shamel....	84
Quincy, Gadsden Co.		
Tallahassee, Leon Co.		
Tropical fruits, yautias, etc., testing.....	Fairchild.	42
Miami and other points.		
G E O R G I A:		
Cork oaks, matting, etc., testing.....	Fairchild.	42
At various points.		
Corn breeding and testing..	Hartley...	50
Generally through State.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

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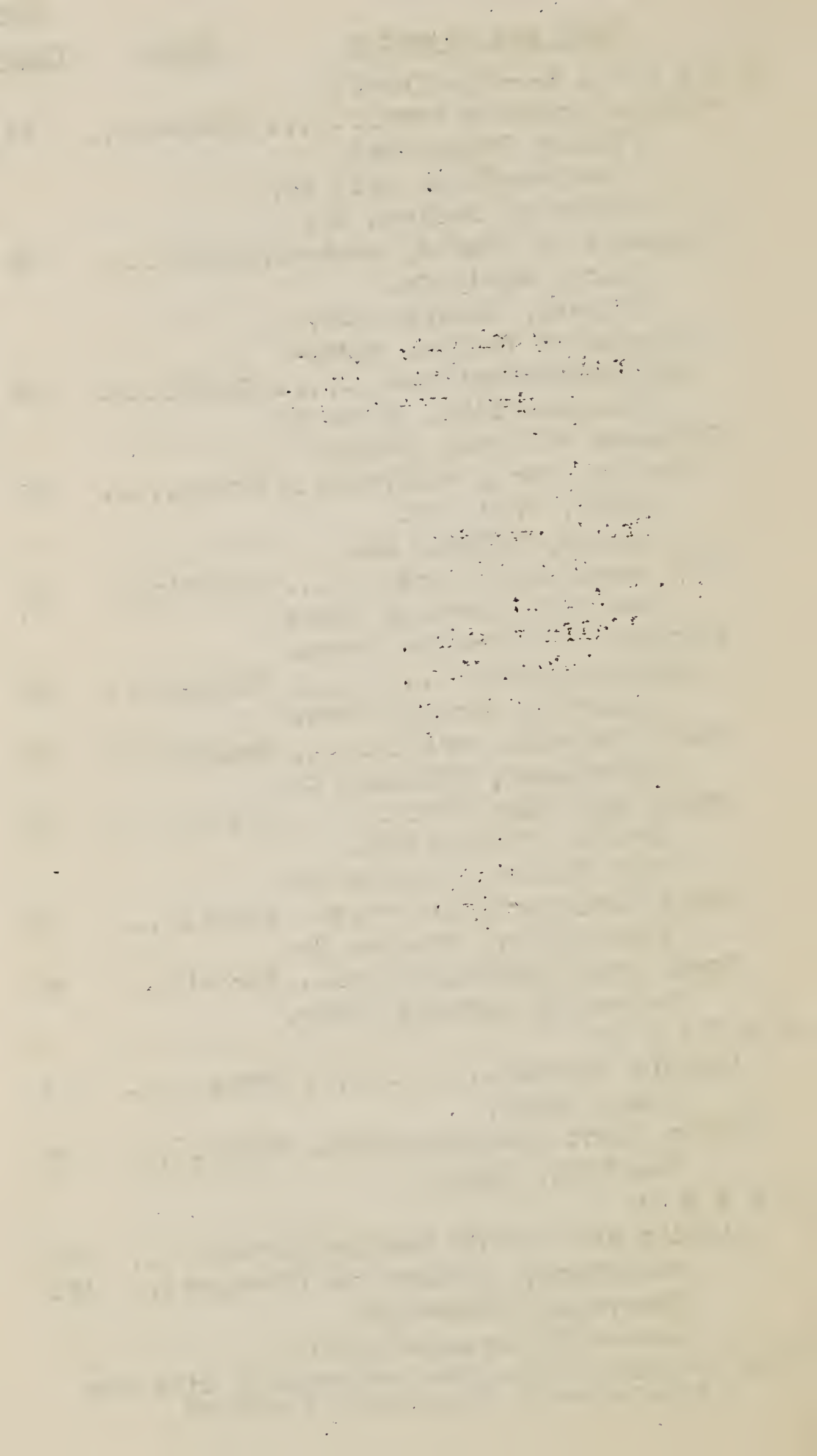
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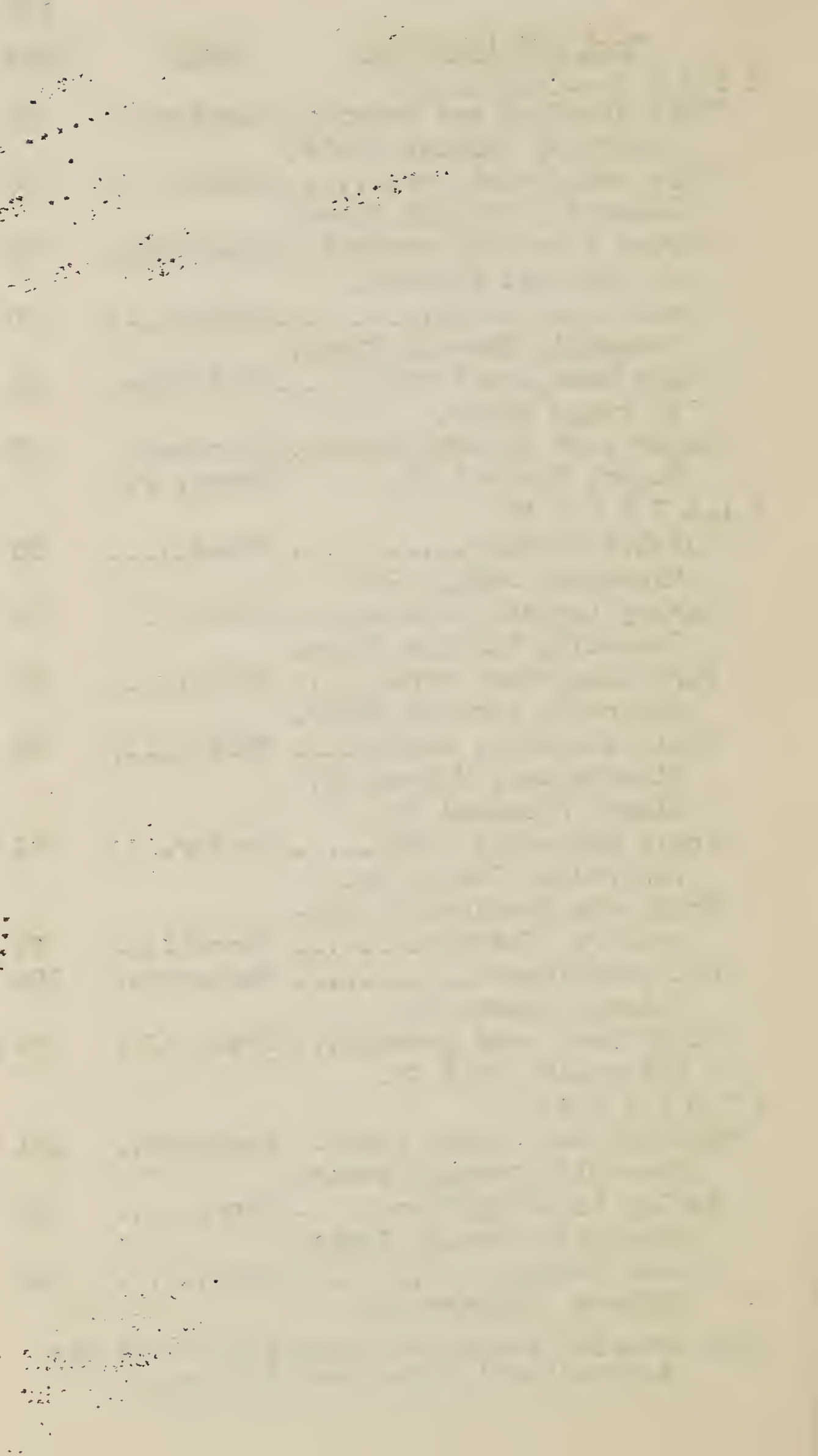
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<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
G E O R G I A---Continued:		
*Cotton breeding work.....	Shamel.....	84
Flowery Branch and		
Gainesville, Hall Co.		
Hoschton, Jackson Co.		
Diseases of fruits, control.	Waite.....	98
Cairo, Grady Co.		
Thomson, McDuffie Co.		
Diseases of fruits, spray-		
ing demonstrations.....	Scott.....	83
Marshallville, Macon Co.		
Diseases of truck crops,		
cotton, etc., control....	Orton.....	72
Cairo, Grady Co.		
Edison, Calhoun Co.		
Farm management work.....	Goodrich..	46
Generally through State.		
Farmers' cooperative demon-		
stration work.....	Knapp.....	60
Generally through State.		
Fruit district work.....	Gould.....	46
Experiment, Spalding Co.		
Fruit marketing work.....	Taylor....	91
Dewitt, Mitchell Co.		
Fort Valley, Houston Co.		
Fruit transportation work..	Powell....	76
Fort Valley, Houston Co.		
Truck crop investigations..	Corbett...	34
Generally through State.		
H A W A I I:		
Alfalfa testing.....	Brand.....	23
Pukoo, Maui.		
*Fiber plant investigations.	Dewey.....	38
Honolulu, Oahu.		
I D A H O:		
Alfalfa and clover testing.(	Brand.....	23
St. Anthony, Fremont Co.(	Westgate..	101
Sunnyside, Elmore Co.		
Generally through State.		
*The asterisk indicates cooperation with the		
Agricultural Experiment Stations		



<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
I D A H O-----Continued:		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Farm management work.....	Hunter....	54
Generally through State.		
Forest diseases, control...	Spaulding.	88
On National Forests.		
Grass experiments.....	Oakley....	70
Generally through State.		
Range management work.....	Griffiths.	48
In range areas.		
Sugar beet investigations..	(Townsend..	92
Sugar, Fremont Co.	(Tracy, J..	
I L L I N O I S:		
Alfalfa testing.....	Brand.....	23
Hinsdale, Dupage Co.		
Barley investigations.....	Derr.....	38
Generally through State.		
Farm management work.....	Drake.....	39
Generally through State.		
Fruit diseases, control...	Waite.....	98
Bloomington, McLean Co.		
Olney, Richland Co.		
Fruit marketing work.....	Taylor....	91
Centralia, Marion Co.		
Grain standardization lab--		
oratory, Chicago.....	Carroll...	29
Oat experiments.....	Warburton.	100
McLean, McLean Co.		
Sugar beet seed growing...	Tracy, J..	94
Riverdale, Cook Co.		
I N D I A N A:		
*Alfalfa and clover tests..	Westgate..	101
Generally through State.		
Barley investigations.....	Derr.....	38
Generally through State.		
Clover testing.....	Brand.....	23
Elkhart, Elkhart Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations



Work and LocationNamePage

I N D I A N A---Continued:

Farm economics, study.....	Peck.....	74
Generally through State.		
Farm management work.....	Drake.....	39
Generally through State.		
Truck crop investigations..	Corbett...	34
Generally through State.		

I O W A:

Barley investigations.....	Derr.....	38
Generally through State.		
Farm management work.....	Warren....	100
Generally through State.		
Fruit diseases, control....	Waite.....	98
Shenandoah, Page Co.		
*Fruit storage experiments..	Powell....	76
Mason City, Cerro Gordo Co.		
*Grain investigations.....	Carleton..	28
Ames, Story Co.		
*Grass experiments.....	Oakley....	70
Generally through State.		
*Plant introduction garden..	Fairchild.	42
Ames, Story Co.		
Sugar beet investigations..	(Townsend..	92
Hazelton, Buchanan Co.	(Tracy, J..	94
Waverly, Bremer Co.		
Sugar beet production and beet-sugar industry, study.	Saylor....	82
Des Moines (headquarters).		

K A N S A S:

Alfalfa and clover testing.(	Brand.....	23
Dodge City, Ford Co.	(Westgate..	101
Stockton, Rocks Co.		
Generally through State.		
*Barley investigations.....	Derr.....	38
McPherson, McPherson Co.		
Corn breeding and testing..	Hartley...	50
Generally through State.		

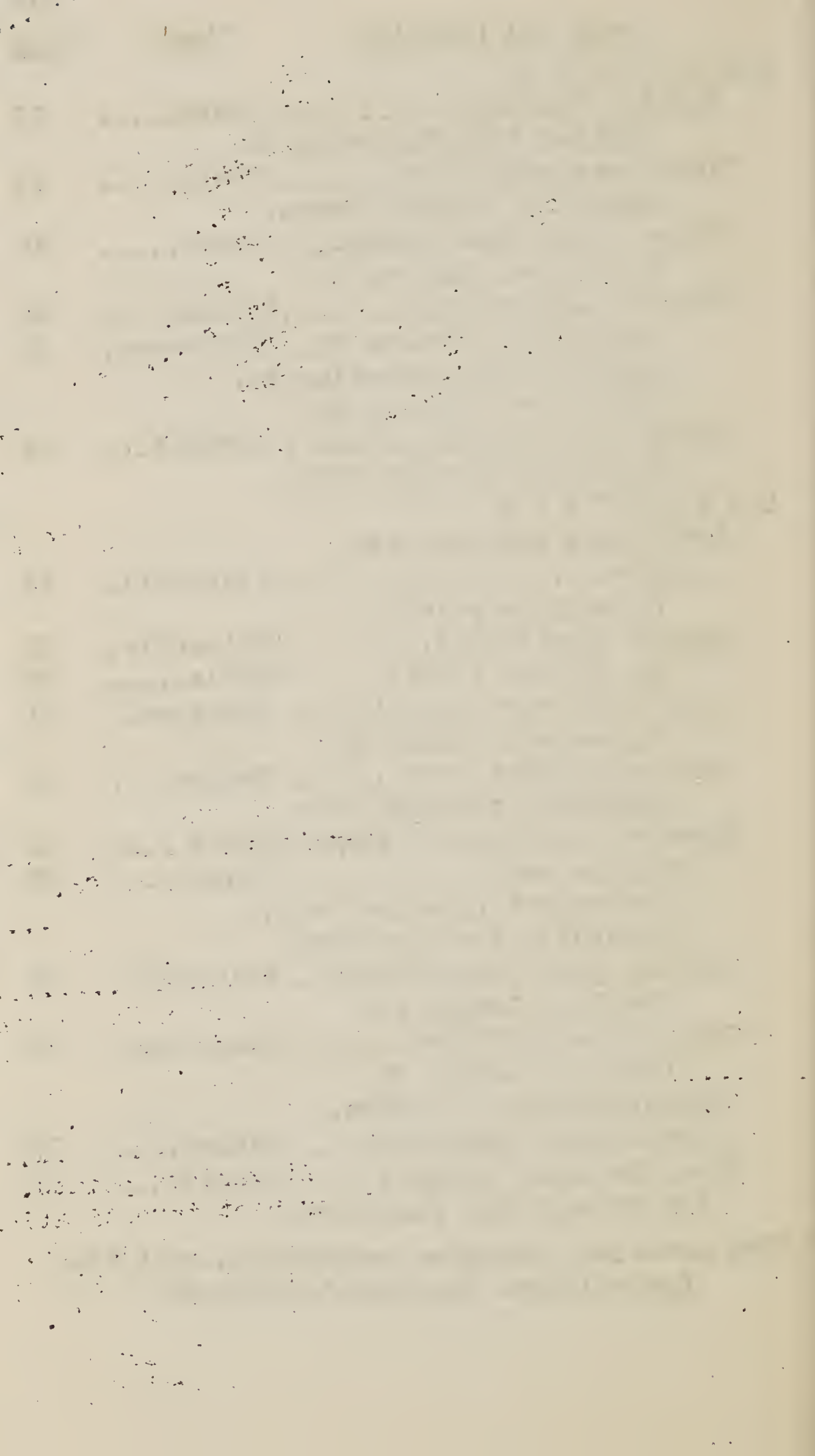
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Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page.</u>
K A N S A S--Continued:		
Cotton and corn acclimatization experiments.....	Cook.....	33
Stockton, Rooks Co.		
Winfield, Cowley Co.		
*Dry land agriculture, experiment farms.....	Chilcott..	31
Garden City, Finney Co.		
Hays, Ellis Co.		
Farm management work.....	Warren....	100
Fruit diseases, control....	Waite.....	98
Arlington, Reno Co.		
Topeka, Shawnee Co.		
Fruit district work.....	Gould.....	46
Hutchinson, Reno Co.		
*Grain experiments.....	Carleton..	28
McPherson, McPherson Co.		
*Grain rusts and smuts, control.....	Johnson...	57
McPherson, McPherson Co.		
*Grain sorghums, tests.....	Ball.....	18
Hays, Ellis Co.		
Grass experiments.....	Oakley....	70
Generally through State.		
Oat experiments.....	Warburton.	100
McPherson, McPherson Co.		
Physical investigations....	Briggs....	24
Garden City, Finney Co.		
Hays, Ellis Co.		
Range management work.....	Griffiths.	48
At various points.		
Sugar beet investigations..	(Townsend..	92
Ashland, Clark Co.	(Tracy, J..	94
Garden City, Finney Co.		
Lakin, Kearny Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
K E N T U C K Y:		
Alfalfa testing.....	Brand.....	23
Hopkinsville, Christian Co.		
*Farm management work.....	Drake.....	39
Generally through State.		
Fiber plant experiments....	Dewey.....	38
Lexington, Fayette Co.		
*Tobacco experiments.....	(Shamel.....	84
Farmington, Graves Co. (Mathewson.		66
Hopkinsville, Christian Co.		
Lexington, Fayette Co.		
Truck crop investigations..	Corbett...	34
Generally through State.		
L O U I S I A N A:		
Artichokes and chayotes,		
tests.....	Fairchild.	42
At various points.		
Bamboo experiments.....	(Fairchild.	42
At various points. (Hills.....		52
Cotton and corn breeding...	Saunders..	81
Shreveport, Caddo Co.		
Farm management work.....	McNair.....	63
Generally through State.		
Farmers' cooperative demon--	(Evans, J.A.	41
stration work.....	(Knapp.....	60
Shreveport (headquarters).		
Generally through State.		
Matting plant experiments..	Fairchild.	42
Crowley, Acadia Co.		
*Rice investigations.....	Chambliss.	30
Crowley, Acadia Co.		
Standardization of grain,		
New Orleans laboratory...	Richey....	78
Tree diseases, control.....	Metcalf...	67
New Orleans and elsewhere.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations



Work and LocationNamePage

M A I N E:

Clover testing.....	Brand.....	23
Lewiston, Androscoggin Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
See also <u>New England States</u> .		

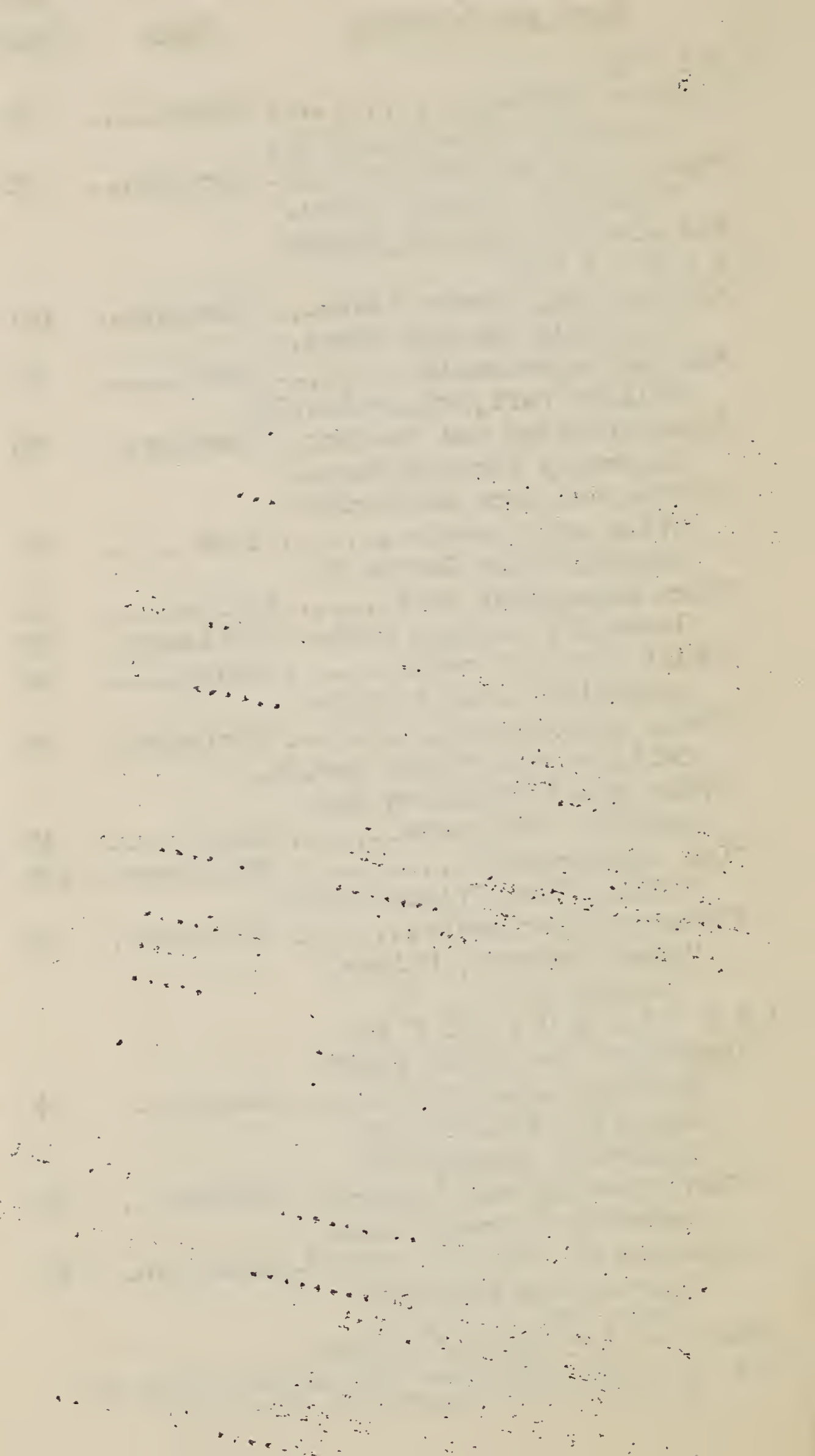
M A R Y L A N D:

*Alfalfa and clover tests...	Westgate..	101
Generally through State.		
*Barley experiments.....	Derr.....	38
College Park, Prince Geo. Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Cotton and corn acclimatiz-		
ation experiments.....	Cook.....	33
Lanham, Prince George Co.		
*Farm management work.....	(Miller....	68
Generally through State. (Spillman..		
		89
Fruit district work.....	Gould.....	46
Generally through State.		
*Grain experiments.....	Carleton..	28
College Park, Prince Geo. Co.		
Grain standardization lab-		
oratory, Baltimore.....	Duval.....	40
*Oat experiments.....	Warburton.	100
College Park, Prince Geo. Co.		
*Tobacco experiments.....	Mathewson.	66
Upper Marlboro, Prince		
George Co.		

M A S S A C H U S E T T S:

*Asparagus and other plant		
breeding experiments.....	Shamel....	84
Concord, Middlesex Co.		
Southwick, Hampden Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Diseases of fruits, control.	Shear, C.L.	85
Brewster and Pleasant		
Lake, Barnstable Co.		
See also <u>New England States</u> .		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations.



Work and LocationNamePage**M I C H I G A N:**

*Corn breeding and testing.. Hartley... 50

Generally through State.

Diseases of orchard fruits,

control..... Waite..... 98

Saugatuck, Allegan Co.,

and other points.

Diseases of small fruits,

control..... Shear, C.L. 85

Lawton and Paw Paw, Van

Buren Co.

Farm management work..... McDowell.. 62

Generally through State.

*Sugar beet investigations.. (Townsend.. 92

Lansing and other points.. (Tracy, J.. 94

Truck crop investigations.. Corbett... 34

Generally through State.

Vegetable testing..... Tracy, W.Sr. 96

Detroit and vicinity.

M I N N E S O T A:

*Alfalfa and clover testing.. (Westgate... 101

Generally through State. (Brand..... 23

*Barley investigations..... (Derr..... 38

St. Paul and elsewhere. (Mann..... 63

*Corn breeding and testing.. Hartley... 50

Generally through State.

Farm management work..... McDowell.. 62

Generally through State.

*Fiber plant experiments.... Dewey..... 38

St. Paul and vicinity.

*Forage crop testing..... Piper..... 75

Generally through State.

*Grain experiments..... Carleton.. 28

St. Paul and vicinity.

*Grain rusts and smuts, con-

trol..... Johnson... 57

Crookston, Polk Co.

St. Paul and vicinity.

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
M I N N E S O T A---Continued:		
Grain standardization laboratories:		
Duluth.....	Ryder.....	79
Minneapolis.....	Sattre.....	80
*Oat experiments.....	Warburton.	100
St. Paul and vicinity.		
*Sugar beet investigations..	(Townsend..	92
St. Paul and vicinity.	(Tracy, J..	94
*Vegetable testing.....	Tracy, W. Sr.	96
St. Paul and vicinity.		
M I S S I S S I P P I:		
*Alfalfa and clover testing..	(Brand.....	23
Crystal Springs, Copiah	(Westgate..	101
Co., and other points.		
Artichokes and chayotes,		
tests.....	Fairchild.	42
At various points.		
Cotton breeding work.....	Boykin....	22
Ittabena, Leflore Co.		
Farm management work.....	Crosby....	37
Macon, Noxubee Co.		
Ridgeland, Madison Co.		
Wiggins, Harrison Co.		
Generally through State.		
Farmers' cooperative demon-		
stration work.....	Knapp.....	60
Generally through State.		
Forage crop testing.....	Tracy, S.M.	94
Biloxi, Harrison Co., and		
other points.		
Rice investigations.....	Chambliss.	30
At various points.		
M I S S O U R I:		
Barley investigations.....	Derr.....	38
Generally through State.		
Farm management work.....	Warren....	100
Generally through State.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
M I S S O U R I---Continued:		
Fruit diseases, control....	Waite.....	98
Louisiana, Pike Co.		
St. Louis and vicinity.		
*Fruit diseases, spraying		
demonstrations.....	Scott.....	83
Anderson, McDonald Co.		
Fordland, Webster Co.		
Springfield, Greene Co.		
Fruit district work.....	Gould.....	45
At various points.		
Grain standardization lab-		
oratory, St. Louis.....	Morris....	69
Grass experiments.....	Oakley....	70
Generally through State.		
*Seed testing laboratory,		
Columbia.....	Brown, E..	26
*Vegetable testing.....	Tracy, W. Sr.	96
Columbia and vicinity.		
M O N T A N A:		
Alfalfa testing.....	Brand.....	23
Chinook, Chouteau Co.		
Barley investigations.....	Derr.....	38
At various points.		
*Dry land agriculture exper-		
iments.....	Chilcott..	31
Utica, Fergus Co.		
Dry land cereal tests.....	Jardine...	55
Lewistown and Philbrook,		
Fergus Co.		
Grass experiments.....	Oakley....	70
At various points.		
Oat experiments.....	Warburton.	100
Bozeman, Gallatin Co.		
Physical investigations....	Briggs....	24
Moore, Fergus Co.		
Range management work.....	Griffiths.	48
At various points.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
M O N T A N A---Continued:		
Sugar beet investigations..	(Townsend..	92
Billings, Yellowstone Co.	(Tracy, J..	94
Bozeman, Gallatin Co.		
N E B R A S K A:		
Alfalfa and clover testing..	(Brand.....	23
Lincoln, Lancaster Co.	(Westgate..	101
North Platte, Lincoln Co.		
Sextorp, Cheyenne Co.		
Generally through State.		
*Alkali and drought resist-		
ant plant breeding.....	Kearney...	58
North Platte, Lincoln Co.		
Barley investigations.....	Derr.....	38
Generally through State.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
*Dry land agriculture exper-		
iments.....	Chilcott..	31
North Platte, Lincoln Co.		
Farm management work.....	Warren....	100
Generally through State.		
Forest diseases, control...	Spaulding.	88
Halsey, Thomas Co.		
Fruit diseases, control....	Waite.....	98
Geneva, Fillmore Co.		
*Fruit diseases, spraying		
demonstrations.....	Scott.....	83
Falls City, Richardson Co.		
Lincoln, Lancaster Co.		
Pawnee City, Pawnee Co.		
Unadilla, Otoe Co.; Etc.		
*Grain experiments.....	Carleton..	28
Lincoln, Lancaster Co.		
*Grain sorghums, tests.....	Ball.....	18
North Platte, Lincoln Co.		
Physical investigations....	Briggs....	24
North Platte, Lincoln Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

Work and LocationNamePage

N E B R A S K A---Continued:

Range management work.....	Griffiths.	48
Generally through State.		
*Seed testing laboratory,		
Lincoln.....	Brown, E..	26
Sugar beet investigations..	(Townsend..	92
Grand Island, Hall Co.	(Tracy, J..	94
North Platte, Lincoln Co.		
*Vegetable testing.....	Tracy, W. Sr.	96
Lincoln, Lancaster Co.		
Waterloo, Douglas Co.		

N E V A D A:

*Alfalfa testing.....	Brand.....	23
Fallon, Churchill Co.		
Reno, Washoe Co.		
Alkali and drought resist-		
ant plant breeding.....	Kearney...	58
Fallon, Churchill Co.		
Arboricultural investiga-		
tions.....	Mason.....	65
Generally through State.		
Cotton and corn acclimatiz-		
ation experiments.....	Cook.....	33
Fallon, Churchill Co.		
Grass experiments.....	Oakley....	70
At various points.		
Range management work.....	Griffiths.	48
At various points.		
Sugar beet investigations..	(Townsend..	92
Fallon, Churchill Co.	(Tracy, J..	94
*Western agricultural exten-		
sion, experiment farm....	Scofield..	82
Fallon, Churchill Co.		

NEW ENGLAND STATES:

Farm management work.....	Dodge.....	39
Generally through States.		
Forest diseases, control...	Spaulding.	88
Generally through States.		
See also <u>Maine</u> , etc.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
N E W H A M P S H I R E:		
Alfalfa testing.....	Brand.....	23
Groonfield, Hillsboro Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
See also <u>New England States</u> .		
N E W J E R S E Y:		
Farm management work.....	Billings..	21
Fruit diseases, control....	Shear, C.L.	85
Vineland, Cumberland Co.		
Fruit district work.....	Gould.....	46
Generally through State.		
*Grape experiments.....	Husmann...	54
Vineland, Cumberland Co.		
Truck crop investigations..	Corbett...	34
Generally through State.		
N E W M E X I C O:		
Alfalfa and clover testing..	(Brand.....	23
Roosevelt, Quay Co.	(Westgate..	101
Generally through Territory.		
*Cactus experiments.....	Griffiths.	48
Agricultural College, Dona Ana Co.		
Economic plants, notes.....	Safford...	80
Forest diseases, control...	Spaulding.	88
On National Forests.		
Fruit diseases, control....	Waite.....	98
Mesilla Park, Dona Ana Co.		
Various other points.		
*Grain sorghums, tests.....	Ball.....	18
Agrl. College, Dona Ana Co.		
*Range management work.....	Griffiths.	48
At various points.		
Sugar beet experiments.....	Townsend..	92
Las Vegas, San Miguel Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
N E W Y O R K:		
*Alfalfa and clover testing.	(Brand.....	23
Elmira, Chemung Co.	(Westgate..	101
Fayetteville, Onondaga Co.		
Gloversville, Fulton Co.		
Generally through State.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Farm management work.....	Dodge.....	39
Generally through State.		
Forest and shade tree dis-	(Metcalf...	67
eases, control.....	(Spaulding.	88
Cold Spring Harbor, Suf-		
folk Co.		
Lake Clear Junction,		
Franklin Co.		
Lyons Falls, Lewis Co.		
New York City.		
Generally through State.		
Fruit diseases, control....	(Shear, C.L.	85
Kendaia, Seneca Co.	(Waite.....	98
Youngstown, Niagara Co.		
Various other points.		
Fruit district work.....	Gould.....	46
Geneva, Ontario Co.		
Fruit marketing work.....	Taylor....	91
Carlton Station, Orleans Co.		
Ghent, Columbia Co.		
*Fruit storage experiments..	Powell....	76
Buffalo, Erie Co.		
Ghent, Columbia Co.		
Syracuse, Onondaga Co.		
Grain standardization lab-		
oratory, New York City...	Leighty...	61
*Grass experiments.....	Oakley....	70
Generally through State.		
Hop experiments.....	Stockberger	89
Waterville, Onondaga Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
N E W Y O R K---Continued:		
*Sugar beet seed growing.... Geneva, Ontario Co.	Tracy, J..	94
Tobacco experiments..... Baldwinsville, Onondaga Co.	Harris....	49
Truck crop investigations.. Mattituck, Suffolk Co.	Corbett...	34
N O R T H C A R O L I N A:		
*Alfalfa and clover testing. Generally through State.	Westgate..	101
Cork oaks, introduction.... At various points.	Fairchild.	42
*Cotton and truck diseases, control..... Auburn, Wake Co.	Orton.....	72
Farm management work..... Generally through State.	Goodrich..	46
Farmers' cooperative demon- stration work..... Generally through State.	Knapp.....	60
Fruit district work..... Generally through State.	Gould.....	46
Grape experiments..... Enfield, Halifax Co. Willard, Pender Co.	Husmann...	54
Forest diseases, control... Biltmore, Buncombe Co.	(Metcalf... (Spaulding.	67 88
*Logume bacteria experiments At various points.	Kellerman.	59
Tobacco experiments..... Points in Pitt Co.	Mathewson.	66
Truck crop investigations.. Generally through State.	Corbett...	34
N O R T H D A K O T A:		
*Alfalfa and clover testing. Braddock, Emmons Co. Dickinson, Stark Co. Generally through State.	(Brand..... (Westgate..	23 101

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
N O R T H D A K O T A---Contd:		
*Barley experiments.....	Dorr.....	38
Fargo, Cass Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
*Dry land agriculture, ex-		
periment farms.....	Chilcott..	31
Dickinson, Stark Co.		
Edgeley, Lamoure Co.		
Williston, Williams Co.		
*Dry land cereals, tests....	Jardine...	55
Williston, Williams Co.		
Farm management work.....	McDowell..	62
Generally through State.		
*Grain experiments.....	Carleton..	28
Fargo, Cass Co.		
*Grain rusts and smuts, con-		
trol.....	Johnson...	57
Fargo, Cass Co.		
*Grain sorghums, tests.....	Ball.....	18
Dickinson, Stark Co.		
*Grass experiments.....	Oakley....	70
Generally through State.		
*Oat experiments.....	Warburton.	100
Agricultural College, Cass Co.		
Physical investigations....	Briggs....	24
Dickinson, Stark Co.		
Edgeley, Lamoure Co.		
Range management work.....	Griffiths.	48
At various points.		
O H I O:		
*Alfalfa and clover testing.(Brand.....		23
Toledo, Lucas Co.	(Westgate..	101
Generally through State.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
*Farm economics, study.....	Peck.....	74
Generally through State.		
*The asterisk indicates cooperation with the Agricultural Experiment Stations		

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
O H I O---Continued:		
Farm management work.....	Drake.....	39
*Grass experiments.....	Oakley....	70
Generally through State.		
*Legume bacteria experiments	Kellerman.	59
At various points.		
Sugar beet seed growing....	Tracy, J..	94
Fremont, Sandusky Co.		
*Tobacco experiments.....	(Garner....	45
Germantown, Montgomery Co.	(Shamel....	84
Truck crop investigations..	Corbett...	34
Generally through State.		
O K L A H O M A:		
Barley experiments.....	Derr.....	38
Generally through State.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Farm management work.....	Youngblood	103
Generally through State.		
Farmers' cooperative demon-		
stration work.....	(Bentley...	20
Tishomingo (headquarters)	(Knapp....	60
Generally through State.		
Fruit district work.....	Gould.....	46
Generally through State.		
*Grain sorghums, tests.....	Ball.....	18
Stillwater, Payne Co.		
O R E G O N:		
*Alfalfa and clover testing.	(Brand.....	23
Carlton, Yamhill Co.	(Westgate..	101
Salem, Marion Co.		
Yonna, Klamath Co.		
Generally through State.		
Farm management work.....	Hunter....	54
Generally through State.		
Forest grazing areas, im-		
provement.....	Coville...	36
Wallowa, Wallowa Co., and		
other points.		
*The asterisk indicates cooperation with the		
Agricultural Experiment Stations		

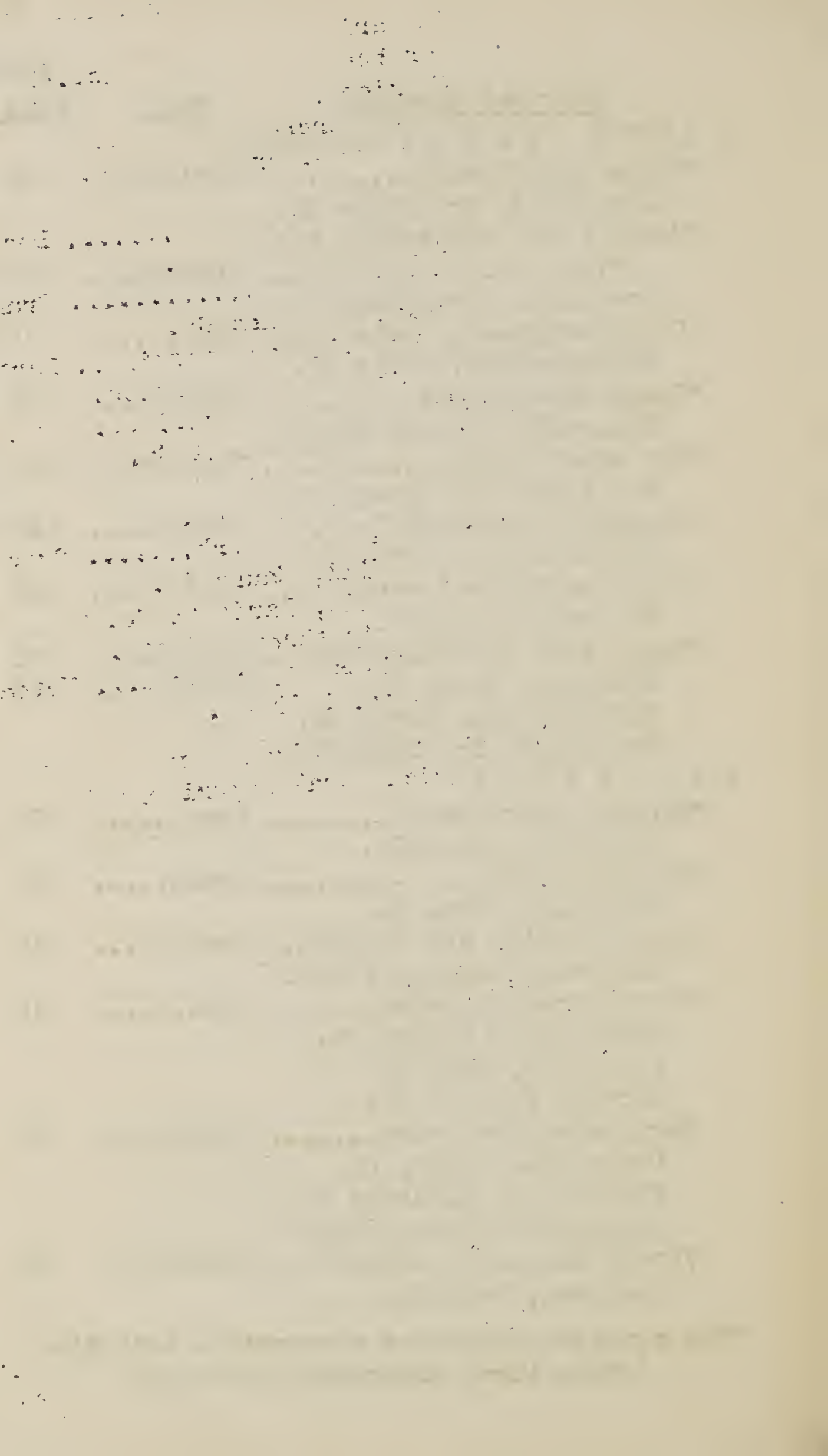
<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
O R E G O N---Continued:		
Fruit diseases, control.... Modford, Jackson Co.	Waite.....	98
Hop experiments..... Independence, Polk Co. Reedville, Washington Co.	Stockberger	89
Range management work..... Generally through Stato.	Griffiths.	48
*Sugar beet seed growing.... Union, Union Co.	Tracy, J..	94
P E N N S Y L V A N I A:		
Farm management work..... Generally through State.	Billings..	21
Fiber plant experiments..... Hanover, York Co.	Dewey.....	38
*Fruit diseases, control.... Northeast, Erie Co. Waynesboro, Franklin Co.	(Shear, C.L. (Waite.....	85 98
P O R T O R I C O:		
*Fiber plant experiments.... Mayaguez, Mayaguez. Yauco, Aguadilla.	Dewey.....	38
R H O D E I S L A N D:		
Clover testing..... Kingston, Washington Co.	Brand.....	23
*Corn breeding and testing.. At various points.	Hartley...	50
See also <u>New England States.</u>		
S O U T H C A R O L I N A:		
*Corn breeding and testing.. Generally through State.	Hartley...	50
Cotton and truck diseases, control..... Hartsville and Lamar, Darlington Co. Monetta, Saluda Co.	Orton.....	72
Cotton breeding work..... Columbia, Richland Co. Lamar, Darlington Co.	Boykin....	22
*The asterisk indicates cooperation with the Agricultural Experiment Stations		

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
S O U T H C A R O L I N A---		
Continued:		
Drug plant experimental garden.....	True.....	97
Timmons ville, Florence Co.		
Farm management work.....	Goodrich..	46
Generally through State.		
Farmers' cooperative demonstration work.....	Knapp.....	60
Generally through State.		
Introduction of artichokes, chayotes, cork oaks, yautias, etc.....	Fairchild.	42
At various points.		
Matting plant experiments..	Fairchild.	42
Jacksonboro, Colleton Co.		
*Rice experiments.....	Chambliss.	30
Jacksonboro, Colleton Co.		
Tea culture experiments....	True.....	97
Summerville, Dorchester Co.		
Truck crop investigations..	Corbett...	34
S O U T H D A K O T A:		
*Alfalfa and clover testing.(Brand.....		23
Bellefourche, Butte Co. (Westgate..		101
Brookings, Brookings Co.		
Generally through State.		
*Alkali and drought resistant plant breeding.....	Kearney...	58
Bellefourche, Butte Co.		
*Barley experiments.....	Derr.....	38
At various points.		
*Corn breeding and testing..	Hartley...	50
At various points.		
Dry land agriculture experiments--cereals, etc.....	(Chilcott..	31
	(Jardine...	55
Bellefourche, Butte Co. (Soofield..		82
Farm management work.....	McDowell..	62
Generally through State.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
S O U T H D A K O T A--Contd.:		
*Grain experiments.....	Carleton..	28
Brookings, Brookings Co.		
*Grain rusts and smuts, con- trol.....	Johnson...	57
Brookings, Brookings Co.		
Grain sorghums, tests.....	Ball.....	18
Bellefourche, Butte Co.		
*Grass experiments.....	Cakley....	70
Generally through State.		
*Oat experiments.....	Warburton.	100
Brookings, Brookings Co.		
Physical investigations....	Briggs....	24
Bellefourche, Butte Co.		
Range management work.....	Griffiths.	48
At various points.		
*Sugar beet investigations..	(Townsend..	92
Aberdeen, Brown Co.	(Tracy, J..	94
Bellefourche, Butte Co.		
Brookings, Brookings Co.		
T E N N E S S E E:		
*Barley experiments.....	Derr.....	38
Knoxville, Knox Co.		
*Clover testing.....	Brand.....	23
Knoxville, Knox Co.		
Corn breeding and testing..	Hartley...	50
Generally through State.		
*Cotton breeding work.....	Bain.....	18
Cades Cove, Blount Co.		
Knoxville, Knox Co.		
Warren, Fayette Co.		
Farm management work.....	Crosby....	37
Darks Mill, Maury Co.		
Whitevillo, Hardeman Co.		
Generally through State.		
Forest diseases, control...	Metcalf...	67
Ducktown, Polk Co.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations



Work and LocationNamePage

T E N N E S S E E---Continued:

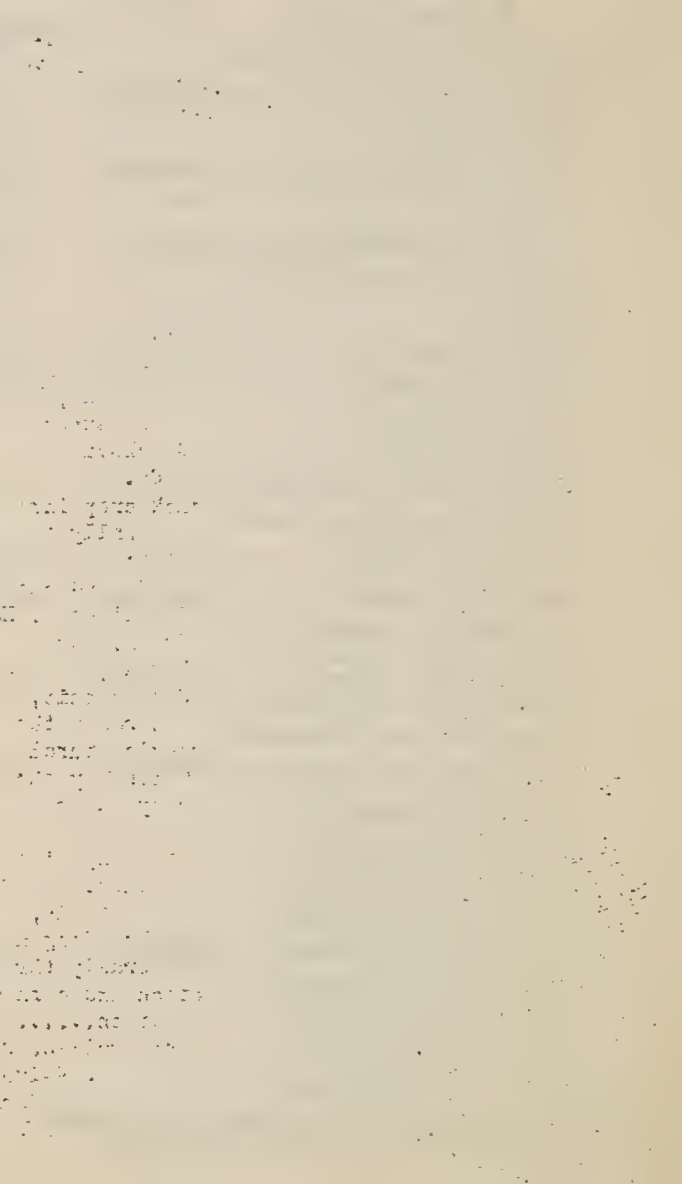
*Grain experiments.....	Carleton..	28
*Oat experiments.....	Warburton.	100
Knoxville, Knox Co.		
*Tobacco experiments.....	(Mathewson.	66
Clarksville, Montgomery	{Shamel....	84
Co.		
Truck crop investigations.	Corbett...	34
Generally through State.		

T E X A S:

Alfalfa and clover testing.(	Brand.....	23
Chillicothe, Hardeman Co.(	Westgate..	101
Groom, Carson Co.		
Laredo, Webb Co.		
San Antonio, Bexar Co.		
Generally through State.		
Arboricultural experiments.	Mason.....	65
Generally through State.		
Barley experiments.....	Derr.....	38
At various points.		
Cactus experiments.....	Griffiths.	48
Brownsville, Cameron Co.		
San Antonio, Bexar Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Cotton and corn acclimatiz-		
ation.....	Cook.....	33
Brownsville, Cameron Co.		
Del Rio, Valverde Co.		
Kerrville, Kerr Co.		
San Angelo, Tom Green Co.		
San Antonio, Bexar Co.		
Various other points.		
*Cotton and corn breeding...	Saunders..	81
Bartlett, Williamson Co.		
Denison, Grayson Co.		
Marshall, Harrison Co.		
Waco, McLennan Co.		
Various other points.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
T E X A S---Continued:		
*Cotton breeding and tests..	Shoemaker.	86
Palestine, Anderson Co.		
Paris, Lamar Co.		
Cotton standardization work.	Bennett...	20
Paris (headquarters).		
Generally through State.		
Dates, etc., testing.....	Swingle...	90
Laredo, Webb Co.		
Drug plants, etc., testing.	True.....	97
Pierce, Wharton Co.		
Dry land agriculture, ex-		
perimental farms.....	Chilcott..	31
Amarillo, Potter Co.		
Dalhart, Dallam Co.		
Dry land cereals, tests....	Jardine...	55
Dalhart, Dallam Co.		
Experiment farm, San Anto-		
nio, Bexar Co.....	Scofield..	82
*Experimental garden,		
Brownsville, Cameron Co..	Green, E.C.	47
Farm management work.....	(McNair....	63
Generally through State.	(Youngblood	103
Farmers' cooperative demon-		
stration work.....	Knapp.....	60
East Texas, headquarters		
at Tyler, Smith Co.....	Procter...	77
West Texas, headquarters		
at Waco, McLennan Co...	Quicksall.	77
Fiber plant experiments....	Dewey.....	38
Brownsville, Cameron Co.		
*Forage crop tests.....	Piper.....	75
Chillicothe, Hardeman Co.		
Generally through State.		
*Grain experiments--sor-		
ghums, etc.....	(Ball.....	18
Amarillo, Potter Co.	(Ross.....	78
Dalhart, Dallam Co.		
Chillicothe, Hardeman Co.		
*The asterisk indicates cooperation with the Agricultural Experiment Stations		



<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
T E X A S--Continued:		
*Grain rusts and smuts, control.....	Johnson...	57
Amarillo, Potter Co.		
Grape experiments.....	Husmann...	54
Brownsville, Cameron Co.		
*Grass experiments.....	Oakley....	70
Generally through State.		
Hybridization of plants....	Oliver....	71
Brownsville and Raymondville, Cameron Co.		
Matting plant experiments..	Fairchild.	42
Pierce, Wharton Co.		
Oat experiments.....	Warburton.	100
Amarillo, Potter Co.		
Peaches, Mexican, tests....	Fairchild.	42
At various points.		
Physical investigations....	Briggs....	24
Amarillo, Potter Co.		
Dalhart, Dallam Co.		
Rice investigations.....	Chambliss.	30
At various points.		
Sugar beet investigations..	(Townsend..	92
Amarillo, Potter Co.	(Tracy, J..	94
Dalhart, Dallam Co.		
McLean, Gray Co.		
Tobacco experiments.....	(Garner....	45
Nacogdoches, Nacogdoches Co.	(Hinson....	52
Palestine, Anderson Co.		
Truck crop investigations..	Corbett...	34
At various points.		
Vegetable testing.....	Tracy, W. Sr.	96
Brownsville, Cameron Co.		
U T A H:		
*Alfalfa testing.....	Brand.....	23
Logan, Cache Co.		
Neph. Juab Co.		
Various other points.		
*The asterisk indicates cooperation with the Agricultural Experiment Stations		

Work and LocationNamePage

U T A H--Continued:

Alkali and drought resist- ant plant breeding.....	Kearney...	58
Corinne and Garland, Box- elder Co.		
Arboricultural experiments.	Mason.....	65
At various points.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
*Dry land cereals, experi- mental farm.....	Jardine...	55
Nephi, Juab Co.		
Economic plants, notes.....	Safford...	80
*Grain sorghums, tests.....	Ball.....	18
Nephi, Juab Co.		
Physical investigations....	Briggs....	24
Nephi, Juab Co.		
Range management work.....	Griffiths.	48
At various points.		
*Soil bacteriology investi- gations.....	Kellerman.	59
At various points.		
*Sugar beet investigations..	(Townsend..	92
Garland, Boxelder Co.	(Tracy, J..	94
Lehi, Utah Co.		
Logan, Cache Co.		
Nephi, Juab Co.		

V E R M O N T:

Forest diseases, control...	Spaulding..	88
Burlington, Chittenden Co.		
*Truck crops--diseases, etc..	(Corbett....	34
Burlington, Chittenden Co.	(Orton.....	72
Rutland, Rutland Co.	(Tracy, W. Sr.	96
Various other points.		
See also <u>New England States.</u>		

V I R G I N I A:

*Alfalfa and clover testing.	(Brand.....	23
Marshall, Fauquier Co.	(Westgate..	101
Generally through State.		

*The asterisk indicates cooperation with the
Agricultural Experiment Stations

Work and LocationNamePageV I R G I N I A---Continued:

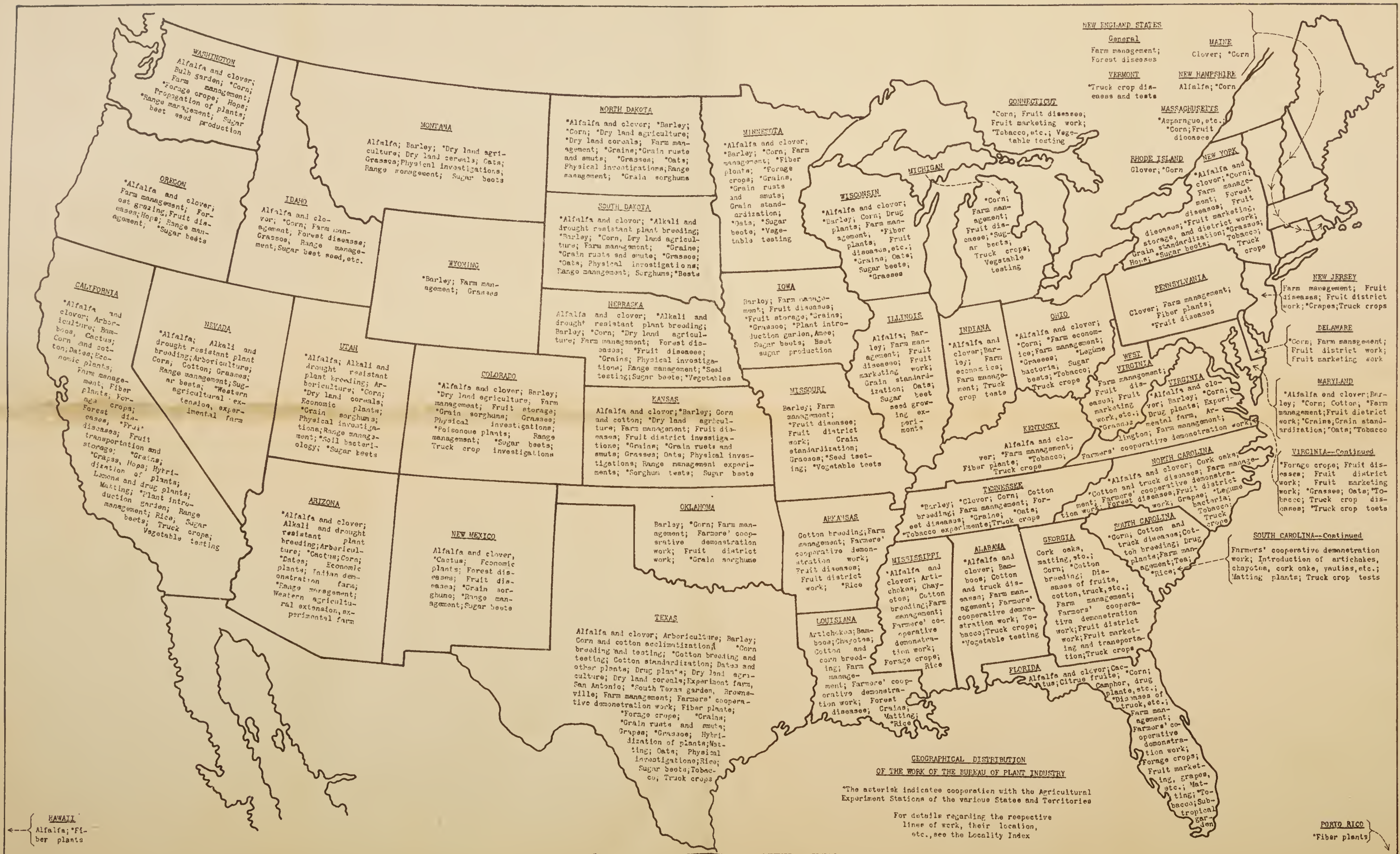
Barley experiments.....	Derr.....	38
At various points.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Drug plants, etc., tests...	True.....	97
Arlington, Alexandria Co.		
Experimental farm, Arlington estate, Alexandria Co.	Corbett...	34
Farm management work.....	Miller....	68
Generally through State.		
Farmers' cooperative demonstration work.....	Knapp.....	60
Generally through State.		
*Forage crop testing.....	Piper.....	75
Generally through State.		
Fruit diseases, control....	(Waite.....	98
At various points.	(Scott.....	83
Fruit district work.....	Gould.....	46
Generally through State.		
Fruit marketing work.....	Taylor....	91
Charlottesville, Albemarle Co.		
Winchester, Frederick Co.		
*Grass experiments.....	Oakley....	70
Generally through State.		
Oat experiments.....	Warburton.	100
Arlington, Alexandria Co.		
*Tobacco experiments.....	Mathewson.	66
Appomattox, Appomattox Co.		
Bowling Green, Caroline Co.		
Chatham, Pittsylvania Co.		
Louisa, Louisa Co.		
Rustburg, Campbell Co.		
*Truck crop experiments.....	Corbett...	34
Norfolk and vicinity.		
Suffolk, Nansemond Co.		
Truck diseases, control....	Orton.....	72
Norfolk and vicinity.		
Vegetable testing.....	Tracy, W. Sr.	96
Arlington, Alexandria Co.		

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
W A S H I N G T O N:		
Alfalfa and clover testing. Westgate..		101
Pullman, Whitman Co.		
Generally through State.		
Bulb propagating garden....	Morrison..	69
Bellingham, Whatcom Co.		
*Corn breeding and testing..	Hartley...	50
Generally through State.		
Farm management work.....	Hunter....	54
Pullman (headquarters).		
Generally through State.		
*Forage crop testing.....	Piper.....	75
Pullman, Whitman Co.		
Generally through State.		
Hop experiments.....	Stockberger	89
Chehalis, Lewis Co.		
Propagation of plants, etc.	Oliver....	71
Bellingham, Whatcom Co.		
*Range management work.....	Griffiths.	48
At various points.		
Sugar beet investigations..	(Townsend..	92
Fairfield, Spokane Co.	(Tracy, J..	94
W E S T V I R G I N I A:		
Farm management work.....	Drake.....	39
Generally through State.		
Fruit diseases, control....	Waite.....	98
Keyser, Mineral Co.		
Martinsburg, Berkeley Co.		
Various other points.		
Fruit district work.....	Gould.....	46
Gerrardstown, Berkeley Co.		
Keyser, Mineral Co.		
Paw Paw, Morgan Co.		
Fruit marketing work.....	Taylor....	91
Keyser, Mineral Co.		
Paw Paw, Morgan Co.		
*Grass experiments.....	Oakley....	70
Generally through State.		

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Agricultural Experiment Stations

<u>Work and Location</u>	<u>Name</u>	<u>Page</u>
W I S C O N S I N:		
*Alfalfa and clover testing. (Brand.....		23
Iron River, Bayfield Co. (Westgate..		101
Generally through State.		
*Barley experiments.....	Derr.....	38
Madison, Dane Co.		
Corn breeding and testing..	Hartley...	50
Generally through State.		
Diseases of small fruits...	Shear, C.L.	85
Grand Rapids, Wood Co.		
Drug plants, tea tests, etc.	True.....	97
Madison, Dane Co.		
Farm management work.....	McDowell..	62
Generally through State.		
*Fiber plant experiments....	Dewey.....	38
Mendota, Dane Co.		
Waupun, Fond du Lac Co.		
*Grain experiments, oats, etc. (Carleton..		28
Madison, Dane Co.	(Warburton.	100
*Grass experiments.....	Oakley....	70
Generally through State.		
Sugar beet seed experiments.	Tracy, J..	94
Chippewa Falls, Chippewa Co.		
Madison, Dane Co.		
Menomonee Falls, Waukesha Co.		
W Y O M I N G:		
*Barley experiments.....	Derr.....	38
Generally through State.		
Farm management work.....	Warren....	100
Grass experiments.....	Oakley....	70
Generally through State.		

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